GAS

OCTOBER 1959

A day at the A.G.A.

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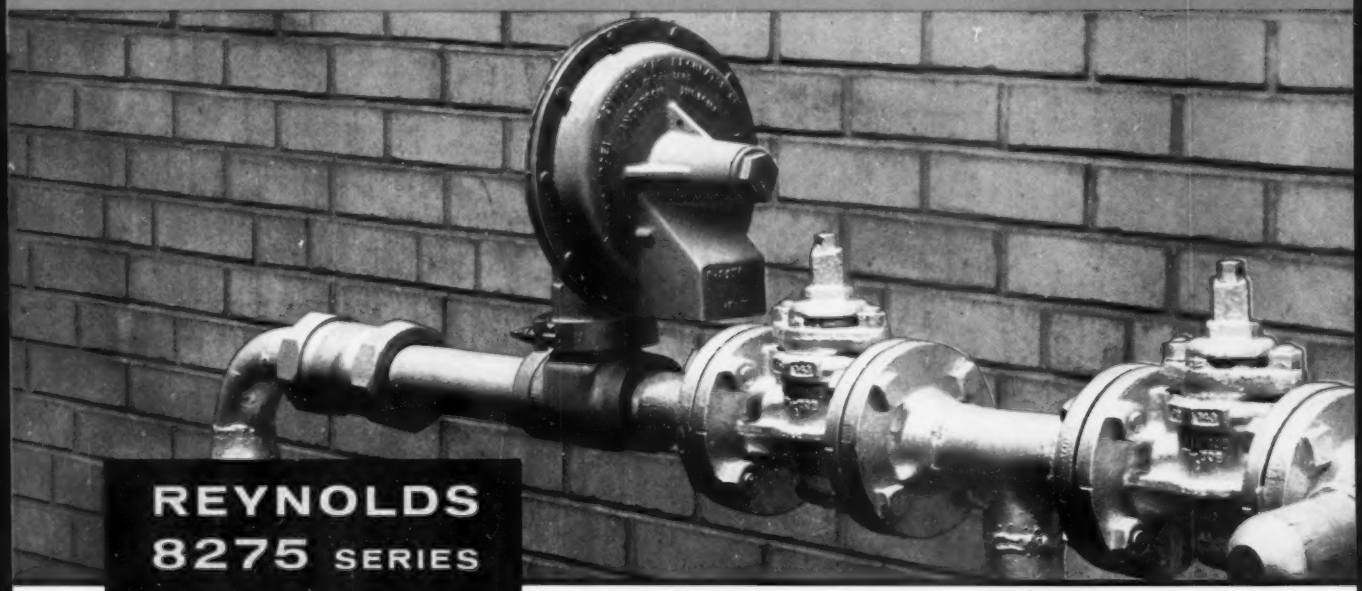

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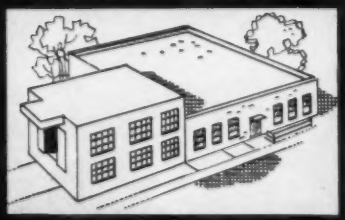

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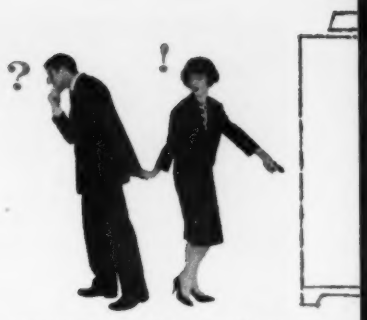

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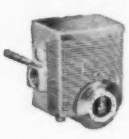

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GAS

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BPA

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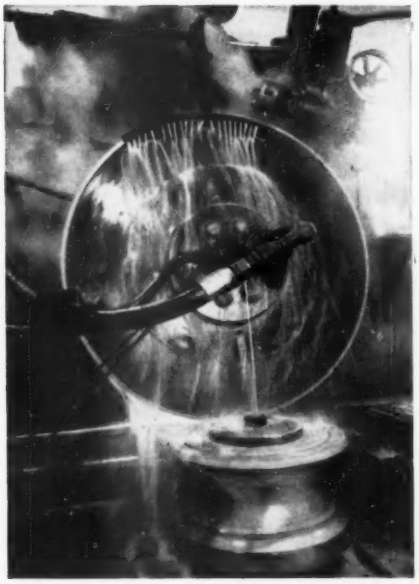

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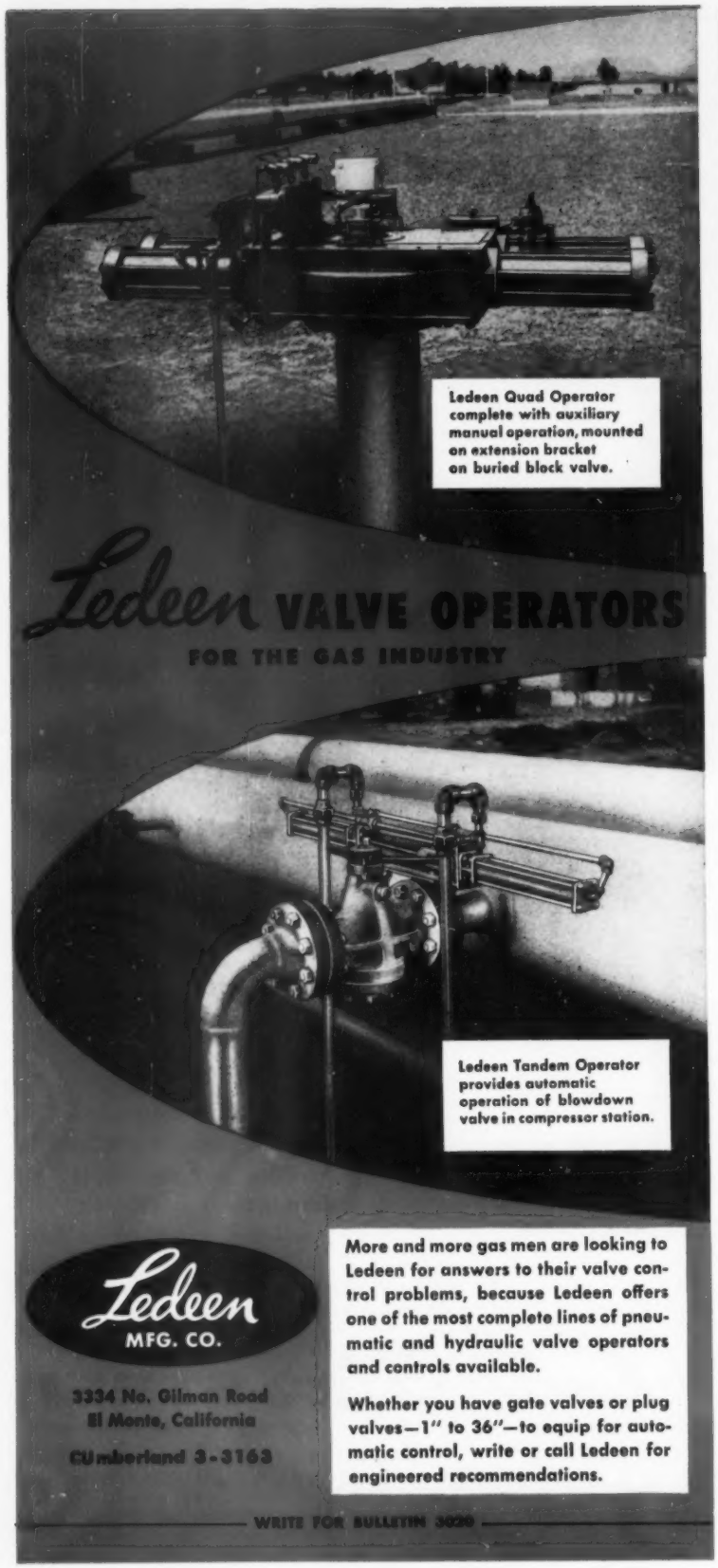
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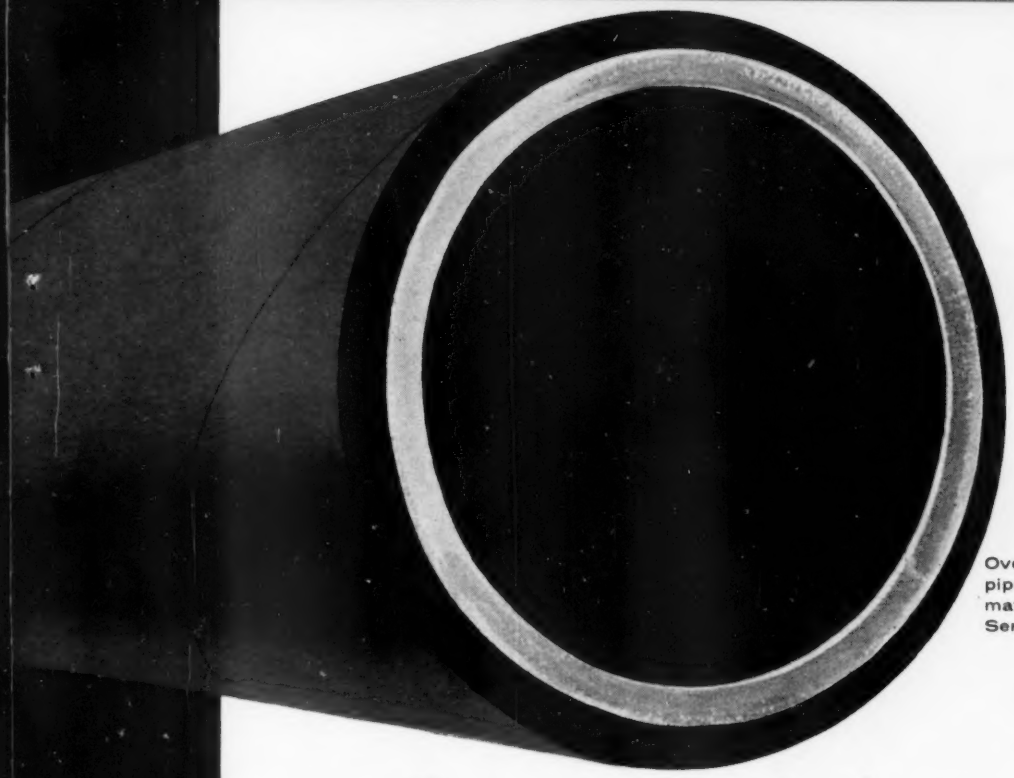

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GAS

OCTOBER 1959

Thermally Thinking

EACH October the American Gas Association's Annual Convention rolls around. This year's meeting in Chicago is designed to reveal what's ahead for the gas industry and the nation in Sales? . . . Research? . . . Management? . . . Finance? . . . Legislation? . . . Operations? . . . Energy and Supply? The vital factor is ideas.

Ideas in themselves are not the answer to anything. It's what you do with them that counts. Many of our gas industry people are idea inventive. More are idea resistive.

Mr. G. Herbert True, an authority on idea and sales power will speak at the 41st AGA Annual Convention in Chicago. As research for his delivery, he has surveyed the creative idea power of 1000 gas industry executives. The results (if any) will be revealed during his talk and will be published in the AGA MONTHLY after the convention.

Parenthetically, notice that a good plug has been given the association's monthly magazine. We are happy to make this mention of a direct association-controlled competitor (for good papers on vital gas industry subjects, only) to display the extreme altruism of my editorial policy for GAS—an investor-owned publication.

But to return to the libretto—a phrase purloined from John Barrymore, who would have made a heck of a good convention man—I have no worry about ideas being generated in the gas industry. I do worry about what happens to them.

Ideas are most apt to mean changes. To me, there is just too much resistance to good ideas in the gas industry simply because they will result in changes. Many gasmen have adjusted themselves to what is. The disturbance of these adjustments causes shocks and builds persistence in conserving what is.

Adjustment to any condition is not hard to do. Though I imply no parallelism to overly "adjusted" gas company vice presidents, animals adjust themselves to zoos. Many humans have adjusted themselves to slavery. Millions of Americans have adjusted themselves to paying farmers millions of dollars for not farming; to bearing heavily graduated income tax; to taking by force the fruits of Peter's labor to pay for Paul's housing, power, education, lunches, libraries, alcoholic rehabilitation (alert, delegates), unemployment, mail delivery, and whatever. It has been suggested in *Fortune* that we have adjusted ourselves to paying FPC commissioners while they fail to regulate

Lord Byron in "The Prisoner of Chillon" (to the boys in our plant, that's "Chillon," not "Chilton") has Francois Bonnivard conclude:

> My very chains and I grew friends,
> So much a long communion tends
> To make us what we are:—even I
> Regain'd my freedom with a sigh.

Thus, the chains of "this is the way we have always done it" capture ideas for imprisonment. To change from what we in the gas industry are, to change from what we in the gas industry do, and to change from established gas industry methods of doing things is a problem of some immensity.

We'll get ideas from AGA's October meeting. What will we do with them?

May I suggest that one way we can more readily reap the benefits of valid ideas developed through the intellectual communion found at all conventions is to spread convention attendance around among more employees of each operating company. Perhaps it is not out of line to suggest that it would be advantageous to see more younger, newer faces at many of the gas industry's meetings.

After all, the greatest resource for the gas industry of tomorrow is the eager, questing minds of your younger employees. You have plenty of the older, experienced people to do the necessary counterbalancing. Don't keep these sharp, hard-working, well-qualified "troops" at their desks all the time. They'll just become as frustrated as the street cleaner who is following a hobby horse if you do.

Any way that you slice it—and they start slicing it pretty thin in those hospitality rooms when they see me—conventions are a place for freedom of thought and idea invention. The promulgation of these ideas is the task of gas company management through selection of delegates that will modulate ideas into action.

J. Fred Ebsen
EDITOR

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GAS HIGHLIGHTS

Legislation by the case

Phillips case will influence pricing for the next five, maybe 10 years—probably will hit the Supreme Court in 1961, after an examiner's decision next spring. Real test for validity of spiral escalation.
The El Paso case decision of Aug. 10 will be no guidepost to treatment of intangible drilling costs and depletion allowances. Thus said Henry Lippitt, SoCal Gas Co., during recent PCGA meeting.

Real zoomy!

Columbia Gulf Transmission has filed with FPC for a jet-powered compressor station. Natural gas will fuel a Pratt & Whitney J-57 jet engine to drive a specially designed Cooper-Bessemer power turbine and centrifugal compressor. The proposed prototype will go in at Clementsville, Ky., if approved, to deliver 10,500 compressor hp for extensive testing and study.

Jingle Bells

Surveys of business gift policies at Christmas time have shown that such giving is generally on the upswing. But, any relative merit depends on how it is done . . . goodwill generates easily and best when the gift is well chosen and presented in a thoughtful manner as an honest token of appreciation.

The fuel oilers are still at it

Now they have cooked up a standard method of grading fuel oil for home burners through use of a toy burner. Called the "Micro Test Burner," its main objective is to develop an octane-like number that gives a combustion index—another way of saying how much the stuff will smoke.

The "Gold Star" goes

Looks like manufacturers of gas-fired water heaters will have a "Gold Star" deal in early 1960. Other divisions of GAMA are also hot for a Gold Star program. Early extension to incinerators has been suggested with clothes dryers and even central heating units following. Critical point: Gold Star is too large and important to risk a program for which there is not complete unified industry support.

Latest glow from gaslights

Our "newest" appliance is selling at the rate of 500,000 units per year during 1959.

Anyone have a credit card?

Gross plant investment will rise from $18.4 to $49.3 billion in the gas industry by 1970. Means about $35 billion for new construction—distribution and transmission—by that date. Big problem: marketing some $20 to $24 billion in stocks and bonds.

Research by our competition

The oil industry has gotten a cooperative effort to improve domestic oil equipment off the ground. . . . EEI has a promotion-advertising program to counter our PAR . . . the coal industry and their influence have a program to hit the natural gas industry at the consumer level. The bills in 1958 for research aimed at markets served by natural gas: petroleum—$11.1 million; coal—$4.2 million; electricity—$42 million. (See "AGA Today" for the gas research program.)

Terrific Ted

As he ends his year as President of AGA, gasmen are talking about the fine job done by Ted Wolfe. He is described at the ablest young utility executive in the game today. He certainly has demonstrated that a combination utility man (his Baltimore Gas & Electric Co. gets two-thirds of its revenues from electricity) can fill this high AGA post with glory. More's the pity he is a combination man.

New bathroom heater

Lone Star Gas Co. (Dallas) research and development engineers have come up with a dynamic gas-fired bathroom heater. Unit uses radiant-type burner as heat source. Thermocouples generate power from the gas heat to drive a built-in air handling fan. Automatic controls are also thermoelectric powered. It is ideal for ceiling mounting in large or small bathrooms . . . instant warming action is produced despite low ambient or surrounding air temperatures. Looks awfully good from here.

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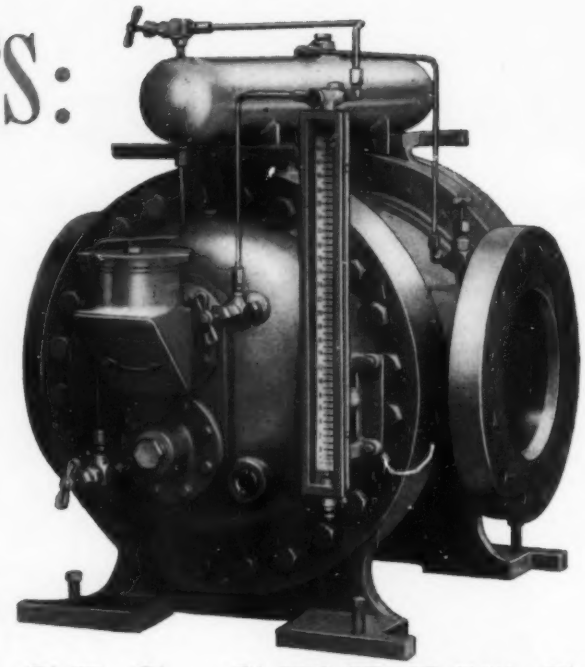

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R-C rotary gas meters require an absolute minimum of maintenance . . . assure almost complete freedom from wear . . . exceptionally high accuracy in metering. A refinement of the basic R-C rotary-positive design which has proved its dependability over the years. These new meters for 600 psig service have incorporated simple in-the-line mounting, straight through flow . . . high-speed gears . . . and a welded steel outer case enclosing a steel inner cylinder. Throughout their extra wide operating range, these new R-C meters assure greater accuracy and improved performance in handling a wide variety of gases.

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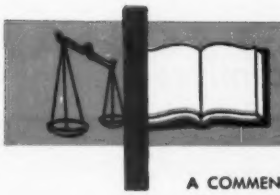


Regulatory and Legislative Trends

A COMMENTARY ON NATIONAL AND STATE DEVELOPMENTS BY AN EXPERT IN UTILITY LAW

FPC and Federal taxes

IN a recent trail-blazing rate case involving an interstate natural gas company, the FPC notified the nation about its treatment of the special tax incentives relating to intangible well drilling costs and percentage depletion, as well as accelerated tax depreciation.

FPC allowed El Paso Natural Gas Co. about $14.5 million of its proposed $18.8 million annual wholesale natural gas rate increase for a three-year period.

El Paso was told to refund amounts collected at revenues in excess of what would have been collected under rates prescribed by the FPC, plus interest at 6 per cent per year. The refunds exceed $15 million.

El Paso filed the proposed increase, affecting customers in Texas, New Mexico, Arizona and California, in October 1954. In November, all but about $211,000 was suspended. The suspended rates went into effect, subject to refund, on April 15, 1955. They remained in effect until Dec. 31, 1957. Then they were superseded by a proposed new rate increase. An FPC presiding examiner, on March 20, 1958, allowed El Paso about $18,598,000 annually of its proposed increase.

The FPC permitted El Paso to maintain its 6 per cent rate of return on its properties beyond the wellmouth but allowed the company a rate return of 8.61 per cent on its gas producing properties. Thus the company got an overall rate of return of 6.35 per cent on its entire rate base of $549,563,775.

Wellmouth properties, the FPC held, must be treated differently, since it is the aim of Congress to give gas producers the benefits of the special tax incentives relating to intangibles and percentage of income depletion. Congress could not have meant that benefits be automatically taken from producers and passed along to consumers in the case of the companies which happen to be subject to regulation, while letting unregulated companies in the gas, oil, and other extractive industries retain these tax advantages.

The commission allowed El Paso to normalize Federal income taxes for rate making purposes by using straight-line depreciation while actually computing and paying a lesser tax by using a liberalized method of depreciation.

• Statutory depletion— 27½% of gross income

The percentage of income depletion privilege arises from Section 613 of the Internal Revenue Code. It comes as an alternative to the "reasonable allowance" standard, which usually means cost depletion. Under Section 613, the allowance for depletion for oil and gas wells shall be 27½ per cent of the gross income from the property, but not over 50 per cent of the taxable income from the property computed without the allowance for depletion. Furthermore, the allowance is required to be the greater of that computed under the cost method or the percentage method.

FPC stated that the percentage of income depletion deduction has had a long history which indicates that it is designed to encourage exploration and the development of oil and gas properties. The legislative history of the Revenue Code stresses the hazards of the industry and the need for incentives to prevent the end of prospecting and wildcatting.

The Courts also show that the statutory depletion provision has the goal of providing a tax-free return of capital—not merely the original cost but the value of the property—and acts to encourage production.

FPC concluded "Plainly the intention of Congress was to grant the advantage of percentage of income depletion to the producers, and unlike liberalized depreciation, there is no postponement of taxes; it is an outright tax saving. It is true that the legislative history does not show that Congress has considered the effect of the percentage of income depletion provision (or that dealing with intangible well drilling costs) on regulation, but Congress could not have meant that the benefits be automatically taken from the producers and passed along to the consumers in the case of those companies in the gas industry which happened to be subject to regulation, while letting unregulated companies in the gas, oil and other extractive industries retain these tax advantages."

• Intangible well drilling costs

The 1954 Revenue Code provides that the owner of an operating mineral interest may at his option deduct intangible drilling and development costs. Included are amounts spent for labor, fuel, repairs, hauling and supplies in drilling wells, clearing ground, and construction.

Thus, as with percentage depletion, it appeared to FPC that Congress intended to grant an advantage to the producers in order to encourage exploration and production.

Expensing the intangible well

drilling costs in the year incurred for income tax purposes leaves the intangibles unavailable for deduction in later years as part of the basis for cost depletion, or depreciation, depending on the nature of the items. To the extent the taxpayer employs percentage of income depletion with respect to the output of some particular well as it must do where it results in a larger deduction than by the use of cost depletion, it may obtain a deduction for depletion undiminished by the fact that it has in past years deducted its intangible well drilling costs as an expense, and thus obtains a tax saving.

FPC asserted that when computing El Paso's actual taxes for the test year ". . . the intangibles produce an adjustment of $12,525,718 increasing the deductions over those used by El Paso and the presiding examiner in computing El Paso's tax for rate purposes. With respect to percentage of income depletion, the adjustment for 1955 happens to be a negative figure of $197,334, since the book figures used by El Paso as deductions in computing its tax for rate purposes were greater than it could use on its tax return. The net adjustment, or increase in deductions, because of intangibles and percentage of income depletion thus amounts to $12,328,384."

The commission declared that the $6,411,000 tax savings from statutory depletion and intangible well drilling costs must be considered as relating to gas producing property rather than to the remainder of the pipeline company's property. FPC said these tax savings must be considered in fixing an allowable rate of return on gas producing property. Accelerated depreciation on the other property does not produce a tax saving and is in a different category.

- **Accelerated tax amortization and depreciation**

FPC allowed El Paso $1,294,000 more for income taxes in the test year than was paid under accelerated depreciation options. It normalized taxes by recognizing tax deferrals.

FPC stated "The question before us now is whether we should allow El Paso to compute its tax allowance for rate making purposes using the straight-line method of depreciation while actually computing and paying a lesser tax by using a liberalized method of depreciation. In other words, should we allow El Paso to treat liberalized depreciation in the same way we have permitted natural gas companies to treat accelerated amortization? We are in accord with the presiding examiner that El Paso should retain the advantages of Section 167, as well as Section 168 of the Internal Revenue Code."

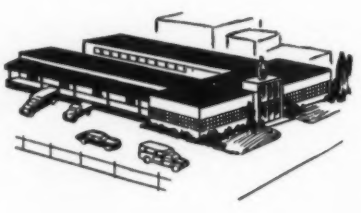
Producers retain benefits of three Federal income tax incentives

The purpose of Section 167 is expressed in the legislative history of the 1954 Revenue Act which first permitted liberalized methods to be used in computing a "reasonable allowance" for depreciation. Both the House and Senate Reports stated that the more liberal depreciation allowances for "all segments of the American economy" should "assist modernization and expansion of industrial capacity, with resulting economic growth, increased production, and a higher standard of living." Testimony before the House Committee by representatives of gas, electric and telephone utilities had emphasized how utilities found the previously used straight-line method of depreciation unfair to them particularly in view of the declining value of the dollar.

The charging of greater depreciation during the early life of property and the charging of less during the later life operates to create a deferral of income taxes. To carry out the clear Congressional intent, FPC stated that a reserve should be established to which the deferred taxes could be credited. The commission was not of the opinion that the reserve account would belong to the rate payers. As the United States Court of Appeals noted in the *City of Detroit* case, with respect to the reserve created in connection with accelerated amortization, the intent of Congress was not to benefit consumers, but to encourage construction. The Court said the solution of FPC, which called on the consumers to pay "normalized" taxes while crediting the difference between actual taxes and normalized taxes to the reserve, does not result in higher rates to the consumer; it simply does not reduce them. FPC concluded in the *Amere* case that it could not strike down an Act of Congress.

The commission pointed to a probable reduction in the cost of money from the use of interest free tax deferrals and its effect upon the company's fair return in the future. FPC concluded that "There is thus a deferral of taxes which will not injure (or aid) the consumer, who will reimburse El Paso for taxes both in the early years of the life of a given facility and in the later years just as though El Paso had never utilized liberalized depreciation. There is therefore no need to make any adjustment in El Paso's return as such. However, in another proceeding it might be shown that the reserves accumulated because of liberalized depreciation and accelerated amortization would have an actual and favorable effect on the company's cost of money, and this effect might lead us to consider whether to reflect this tendency in determining a fair rate of return."

Here is a rate decision which should be pleasing to all natural gas producers under FPC regulation. They retain the benefits of the three Federal income tax incentives of (1) statutory depletion, (2) intangible well drilling costs, and (3) accelerated depreciation. ■



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TECHNICAL TRENDS

By GUY CORFIELD

Beneficent bacteria

Bacteria are tiny one-cell organisms so small that 200,000 could cluster on the period on a printed page. Some of them are hostile to humans, as was the case with those first discovered by Pasteur. But scientists are finding more and more ways in which many strains of bacteria can be put to beneficial use, in some instances even to do work that cannot be accomplished by conventional processes. Furthermore, by selective breeding or mutation, strains of bacteria are being developed for specific jobs under conditions of temperature, toxicity, etc., in which their forebears could not exist. The bacteriologist has become an essential member in the research team of many industries, and has developed special techniques for exploration into a seemingly unlimited field.

The bacterial treatment of sewage has been practiced for many years. Under controlled conditions methane is formed and can be recovered in sufficient concentration to be used as a combustible gas. The British are experimenting with a modification of this. They enrich the sewage with sulfates, to favor the propagation of a reducing type of bacteria which break down the sulfate to obtain oxygen, and produce hydrogen sulfide gas which can be recovered and converted to sulfur or sulfuric acid. This is reported to be successful on a pilot plant scale. Incidentally, these, or similar bacteria, are the cause of the so-called bacterial corrosion of underground pipelines. In this instance the bacteria assume a hostile role. They propagate in damp soil that contains organic matter and sulfate, and the hydrogen sulfide they produce attacks and corrodes steel pipe buried in such areas.

An ingenious method of exploration for oil and gas takes advantage of a type of bacteria that feed on hydrocarbon gases such as methane and ethane. Soil samples are collected and examined in the laboratory and the presence of these particular bacteria are an indication of underground petroleum deposits from which gases are seeping in amounts undetectable by other means. Still in the realm of petroleum and fuels, experiments are progressing in the breeding of bacteria that may release oil from depleted oil fields and from oil shale. The hoped-for and expected effect in this case is production by the bacteria of liquids and gases that will break down the sands and shales to release the oil. There is even work being done by the U. S. Bureau of Mines on the bacterial breakdown of coal which might lead to useful processes and products.

Equal development is occurring in the mineral industries, in both exploration and production. Many industrial waste products can be treated to solve otherwise difficult disposal problems. In the fields of drugs and antibiotics the practitioner is hard put to keep up with new developments in the pharmaceutical laboratory. Even the space age is looking to bacteria for assistance in the problem of life-supporting environment. A system employing bacteria and algae gives promise of not only purifying exhaled air by converting the carbon dioxide back to oxygen, but also of providing food, all in a continuous closed cycle system. (See *Technical Trends*, November 1958, article entitled "Algae—Bane or Blessing.")

Low melting-point glasses

Bell Telephone Laboratories have announced development of a new group of low melting-point glasses. They feel the product may have far-reaching implications for the protection of moisture-sensitive devices—resistors, printed circuits, etc. These glasses melt at temperatures between 260 and 660 deg. F. This is several hundred degrees lower than the melting point of previously known glass. At these temperatures, the glasses have a consistency of castor oil at room temperature, which is a viscosity suitable for coating application by dipping. They can also be evaporated and condensed as thin glass films.

They are composed of varying proportions of sulfur or selenium and arsenic and thallium. Electrically, they range from semi-conductors to insulators. Chemically, they are as durable as glasses in general. They are insoluble in water, dilute alkalis, organic solvents, and acids including hydrofluoric; they are, however, attacked by concentrated alkalis. They are extremely impermeable to water and gases. Additional information can be obtained from Technical Information Service, Bell Telephone Labs., 463 West Street, New York 14, N. Y.

Aluminized plastisol fuel

In the expanding technology of jets, rockets, missiles and space ships the development of superfuels or super-propellants is one of the vital phases. Some of these fuels, or at least the techniques involved, may invade the commercial fuel markets as the manufacturers seek expanded production. It is therefore interesting to watch developments.

One of the latest to receive public announcement—as is generally the case, it has been under wraps for several years—is a solid aluminized plastisol propellant. It is composed of polyvinyl chloride plastic, a plasticizer oil, aluminum powder, and ammonium perchlorate. The aluminum perchlorate acts as the oxidizer to provide oxygen to burn the other constituents. The PVC plastic in granular form, and the other ingredients, are mixed to the consistency of mud. This is heated to 350 deg F and then can be extruded or cast, and cooled, into solid bars. It can then be cut by a saw to convenient lengths for charging to the combustion chamber of the rocket.

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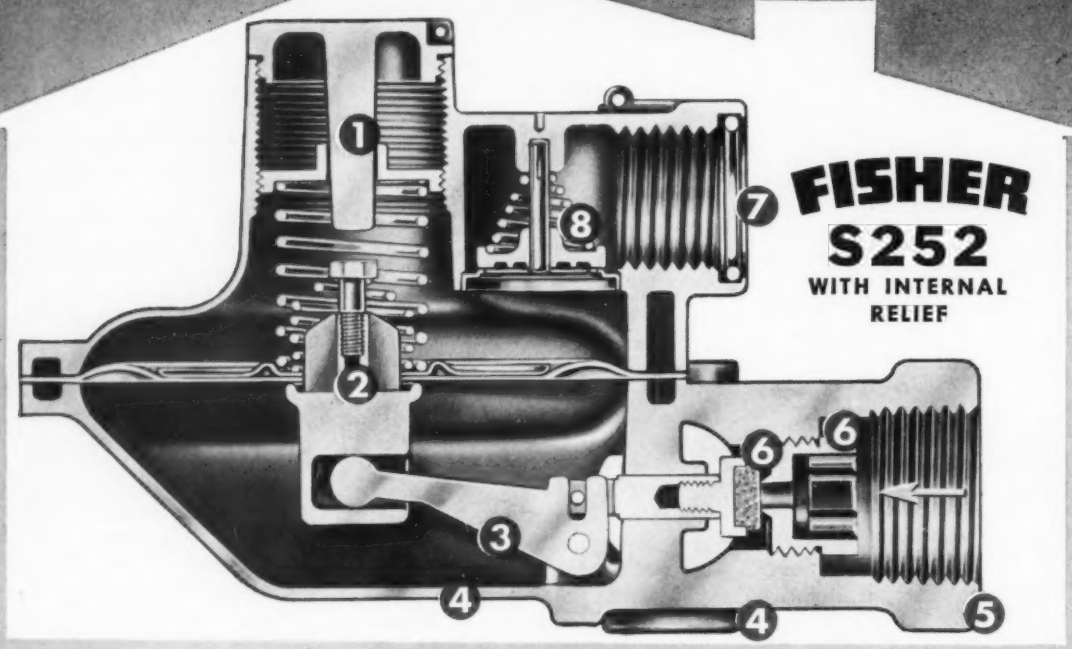

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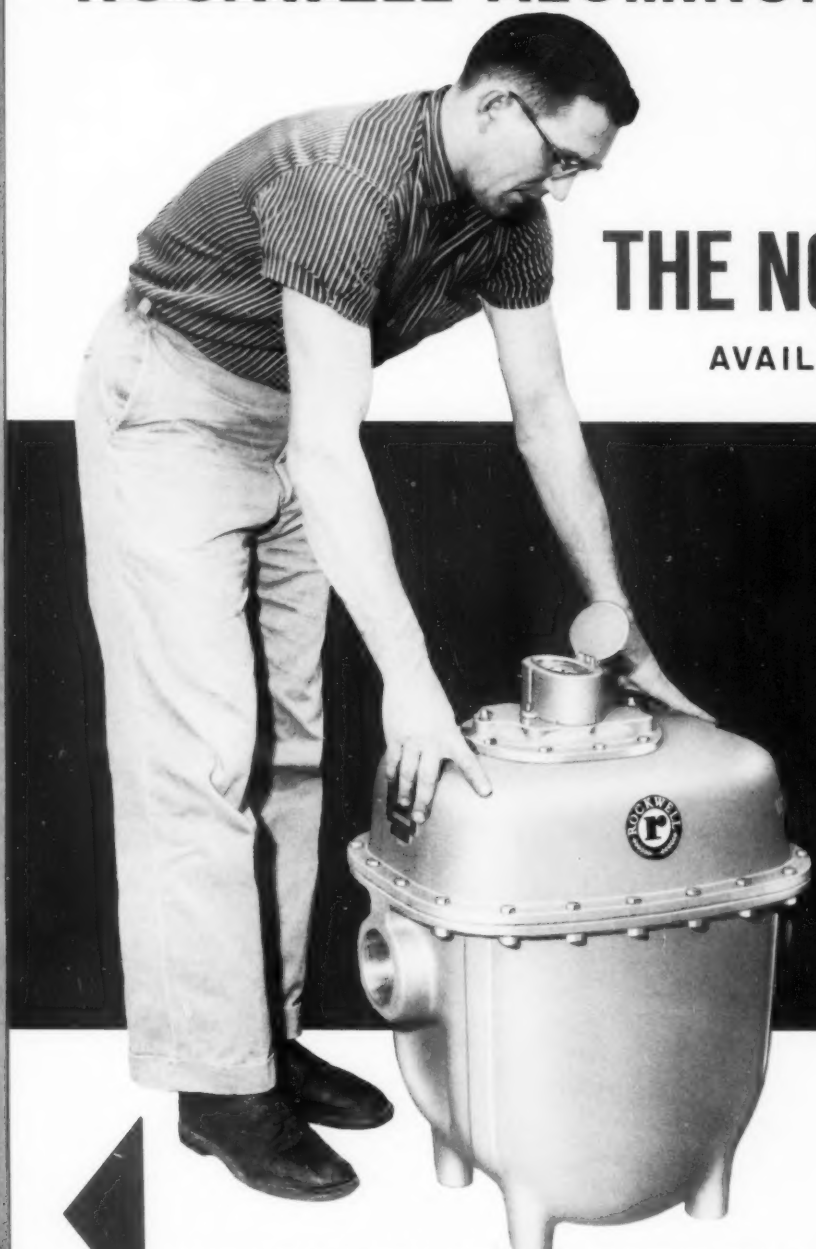

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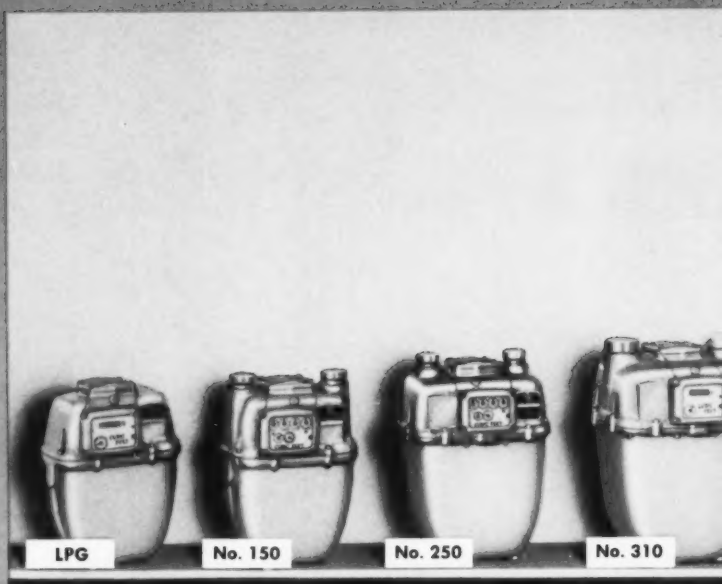

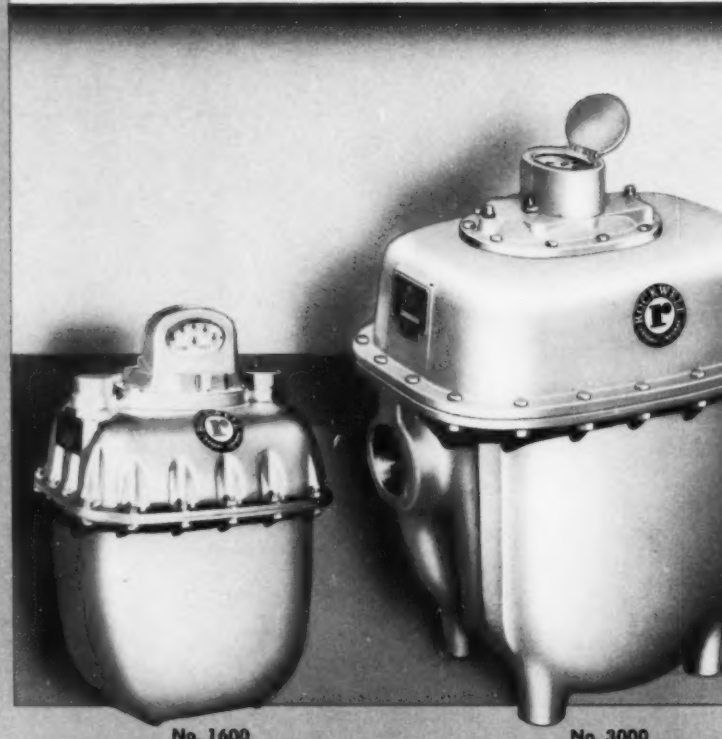

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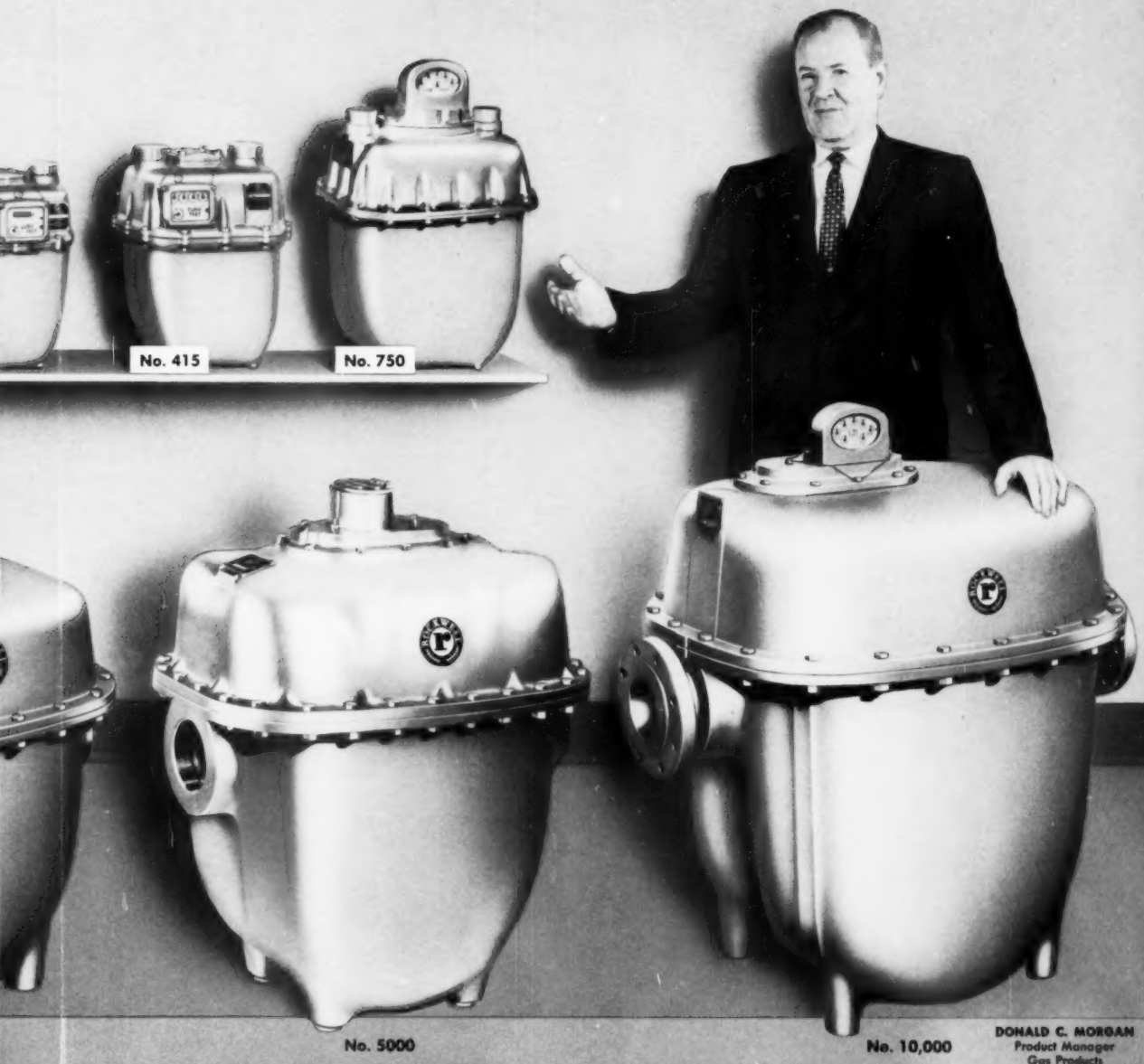

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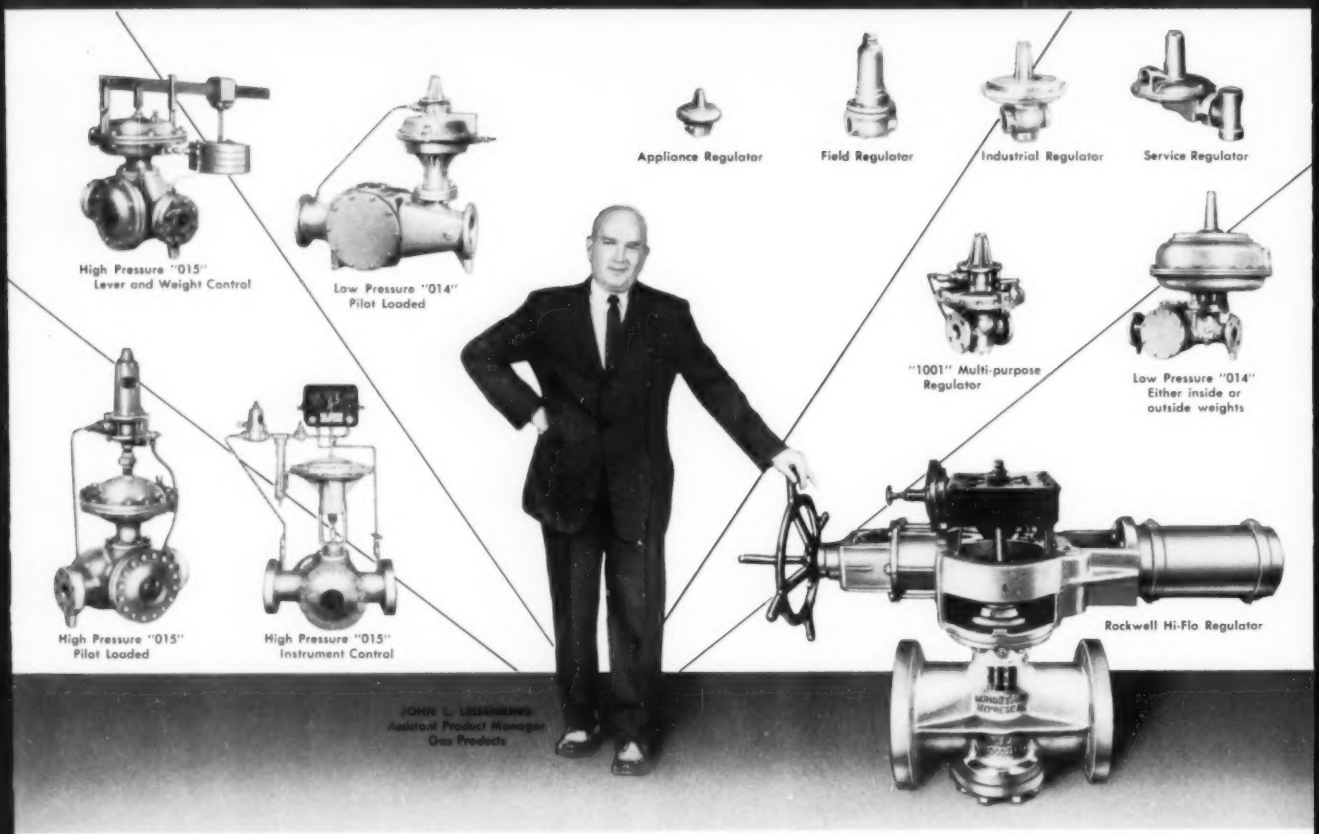

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WASHINGTON

By NEIL REGEIMBAL
GAS Washington Bureau

"Every man for himself" in election year

ALL deals are off. In election-year 1960, it will be strictly every industry for itself in the rough-and-tumble battles coming up over depletion, natural gas legislation, and coal and oil measures.

Leading legislators in cloakroom talk during the final days of this year's session made it clear that the hard-won agreements of the past few years to compromise the widely differing demands of the gas, coal, and so-called "consumer" interests have collapsed.

At one time, there was a fairly firm agreement involving the fuel and "consumer" champions on Capitol Hill. It had several parts. For one thing, it called for passage of a natural gas bill—if the gas industry could agree what it wanted—with a "coal amendment" prohibiting industrial gas sales at less than a pro-rated cost plus fair profit price.

Depletion allowances would be raised for coal, instead of cut for gas and oil. The raft of bills sought by the FPC to speed up case handling would be passed.

The gas industry itself, by failing to agree on natural gas legislation, knocked the first prop out from under the agreements. They finally collapsed when Rep. Oren Harris (D., Ark.), sponsor of the gas bill and chairman of the House Commerce Committee, with obvious irritation at the industry's division, refused to push the bill unless there was solid support for it.

There wasn't. When the gas bill died, so did the other agreements.

The outlook for next year now is not good for the gas industry. While the industry's natural gas bill will undoubtedly remain buried, election-year politics will revive other bills which the gas industry has fought.

For instance, federal safety standards, tighter price controls, import controls, a coal-industry backed bill outlawing "dump sales," and other restrictive or even punitive measures stand a chance of passing.

The big fight will come over efforts to pare the 27½ per cent gas and oil depletion allowance. There is a strong possibility that the attacks on the depletion rate will be successful.

It's good politics to "hit the rich gas and oil barons" in an election year, whether the method is justified or not. (Lower depletion would raise the price of gas to consumers in the end, while bringing relatively small increases in revenue to the government.)

There is an even more powerful political tide running against the present depletion allowance.

Democrats had a lopsided majority in Congress this year, but they failed to channel their power and the results were disastrous. President Eisenhower, badly outnumbered in Congress, generalled a tightly-knit Republican minority to victory after victory. Ike got most of what he wanted, the opposition never could get a team going and scored only sporadically.

All the lush promises of a year ago thus are unfilled. On top of these defeats, the GOP has made strong gains in popularity by supporting strong labor reform legislation, constant and loud attacks at "inflation" and inflationary legislation, and the tough stand of Vice President Nixon on his highly successful tour of Russia.

Thus, the Democrats have a lot of ground to recapture. House Speaker Sam Rayburn (D., Texas), venerable boss of the House Democrats, took some serious setbacks this year from his recalcitrant colleagues. But it's safe to assume he'll have them back in line with an election coming up next year in which all of them need the political tid-bits that "Mr. Sam" can dispense or withhold at whim.

Depletion allowances will be a natural peg for a Democratic attack on Ike and his party. Under two Treasury Secretaries (George Humphrey and Robert Anderson), the Administration has backed the present depletion rate. Both have said they would welcome a new study of the rate, but have supported the present rate as about sufficient to maintain necessary reserves.

But the 30-year-old contention that depletion is needed to prevent shortages by stimulating the large exploration investments may not appear very strong. In the case of oil, there is an over supply for the immediate future. Gas reserves are steadily gaining ground, and new Canadian supplies are helping swell available reserves.

Although these are short-run situations, and discount the tremendous growth in demand expected from the sharply rising population rate and economic activity, they will be used to counter the contention of the gas and oil industries that depletion is necessary.

Continued on page 194

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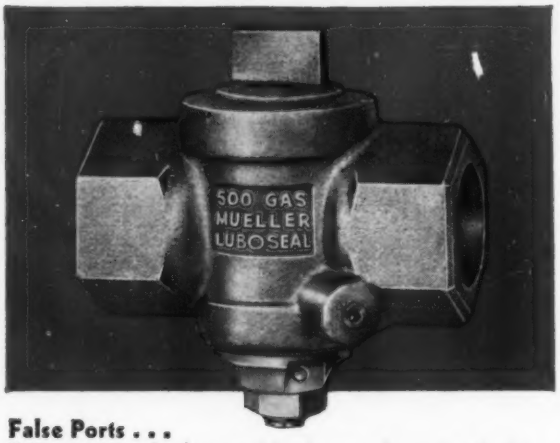
...ground key surfaces and "quad-rings" provide pressure seal



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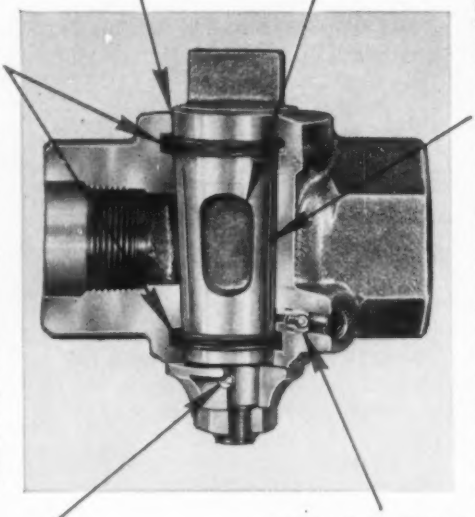
False Ports...
False ports in the key and body are aligned with the true ports in the body and key when the stop is in the closed position. This prevents grit or dust in the gas from settling upon the polished sealing surfaces and later damaging them when the key is turned to open the stop. Seating contact is reduced to only those areas where it is useful, resulting in an easier turning stop.

Quad-Ring Seals...
Top and bottom of the key are positively sealed by quad-rings located in annular grooves in the stop body. The quad-rings also pressurize the lubricant — deflecting as the lubricant reservoir is filled and expanding to keep pressure on the lubricant as it is used.



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The lubrication system of LubOseal Stops maintains a proper grease film on the seating surfaces, assuring easy turning and pressure tightness. Four vertical grooves in the key distribute the lubricant over the ground and lapped surfaces each time the stop is operated. The quad-rings in the circular grooves and the entire seating surface between these grooves are fully lubricated. In any position other than fully "opened" or fully "closed", the vertical grooves are disconnected from the circular reservoir grooves, preventing the line pressure from forcing the grease out of the lubricant system.

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A heavy bronze washer is secured to the lower end of the key by a drive-lock pin in a blind hole, thereby permanently maintaining the perfect adjustment between the key and body. Stop is operable with the stem nut removed or with the nut over-tightened to the point of stripping the threads, providing an additional safety feature.

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By MARSHALL E. PARKER

Pipe-to-soil potential

"PIPE-TO-SOIL" potential is the corrosion engineer's most commonly used measurement. At the same time, it is one of the least understood. In fact, it may be said that it is impossible to measure the difference in potential between a metallic structure, such as a pipe, and an electrolyte, such as the soil. We can readily measure the difference in potential between two points on a metallic structure, or between two different metallic structures, simply by connecting the proper kind of instrument between them. There are some complications, which will be discussed later. But for the moment we can assume the existence of a sort of ideal voltmeter. It will always give us the correct value of the potential difference across its terminals.

The problem arises from a simple fact of nature: Whenever a metallic conductor and an electrolytic conductor are in contact, a potential difference is generated at the contact surface. Furthermore, this potential will change with time, with temperature, with the amount of current flow across the boundary, and with the direction of current flow. *There is no way to measure this potential.* We can measure the algebraic sum of *two* such potentials. But this is the best we can do. When we connect the two terminals of our voltmeter across the terminals of a flashlight cell, we are measuring a carbon-electrolyte potential and a zinc-electrolyte potential, oppositely directed. Their difference is about 1.5v, which is what we measure. If the cell is under load at the time, we measure a lower voltage —lower by the amount of the IR drop in the whole cell. But we still cannot measure either of the electrode-electrolyte potentials alone.

When we take an ordinary pipe-to-soil potential, we connect one terminal of our ideal voltmeter to the pipe, by means of a test lead or a contact bar. The other terminal we connect to a copper rod, which is immersed in a saturated solution of copper sulfate. This solution in turn is in contact with the soil through the porous plug in the bottom of what we may call an electrode, a cell, or a half-cell. We are thus measuring the opposed potentials of a steel-soil contact and a copper-copper sulfate contact—in addition to any IR drops in the soil, any potential differences in various soil-soil contacts, and certainly at least one copper sulfate-soil contact. We cannot measure any of these alone.

We are, however, assured by the electrochemists that the copper-copper sulfate potential is reasonably constant. (It has a known temperature coefficient, for which correction can be made.) It is, within limits, a "reversible" potential; that is, the potential does not change for a mere reversal of current, provided that the current density is low. It is not bad about polarizing, or changing its potential with even fairly large values of current. This is important, for some metal-liquid junctions change by several hundred millivolts under such conditions.

It should be pointed out that when the electrochemists tell us that the copper-copper sulfate junction does this or that, they mean that it behaves in this way *when combined with a hydrogen electrode.* For it is still impossible, even for an electrochemist, to measure the potential of a single electrode-electrolyte junction. By definition, the potential of a standard hydrogen electrode is zero. By definition, and by definition alone. Also by definition, the temperature coefficient of a hydrogen electrode is zero.

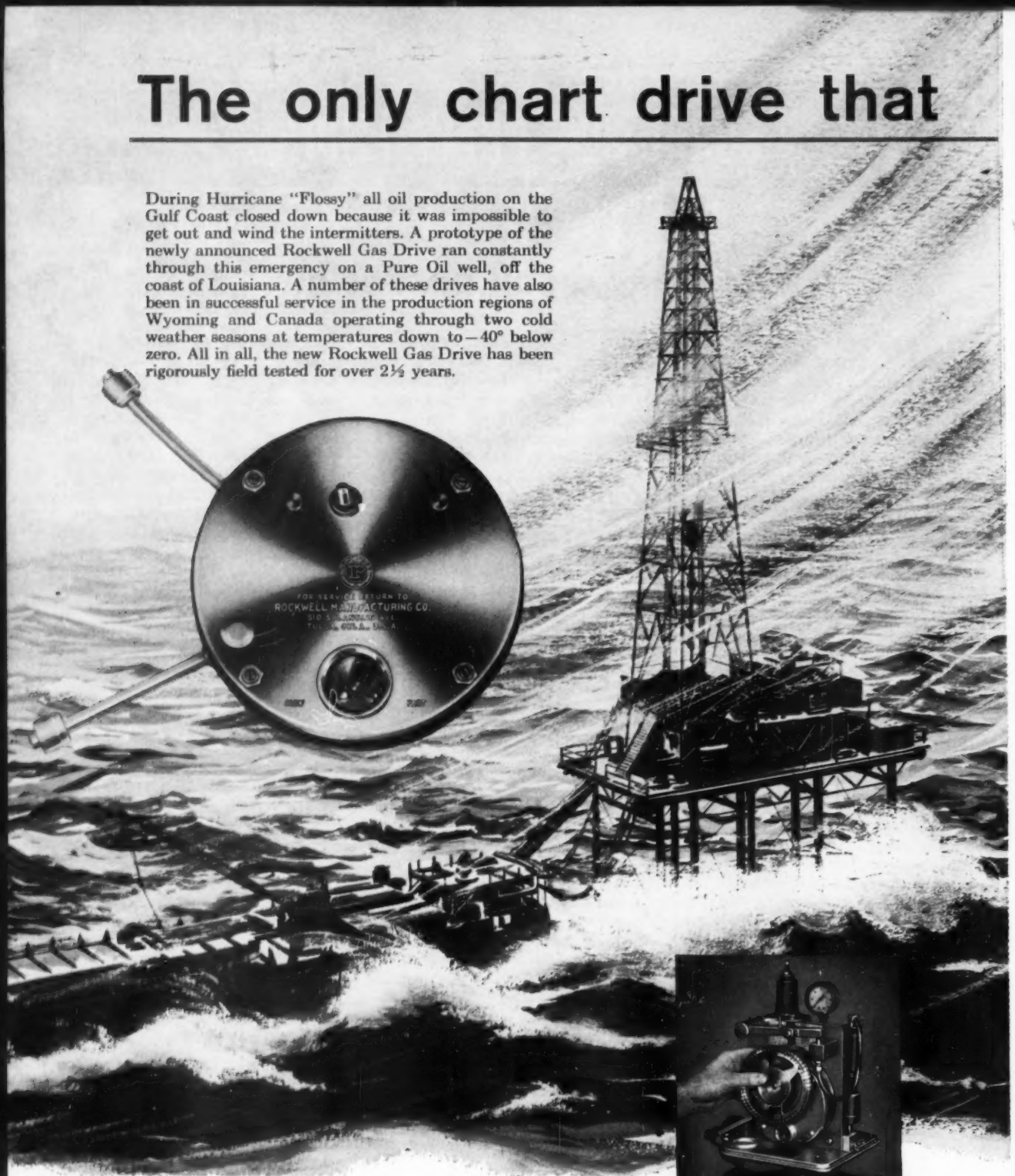
Occasionally, one encounters a paper in which all of the pipe-to-soil and other potentials which were taken with reference to a copper-copper sulfate electrode are corrected. They are brought to their true values by adding, algebraically, the difference between copper and the hydrogen electrodes. As a matter of fact, a potential referred to hydrogen is no more correct than one referred to copper. What is being done is that the data are being brought into terms with which the particular author—usually an electrochemist—is familiar. In exactly the same way, experienced corrosion engineers prefer to correct readings to the copper sulfate standard (unless they happen to have acquired their experience using a lead-lead chloride cell.)

The value we get, then, when we measure pipe-to-soil potential with reference to a copper-copper sulfate electrode is a reproducible and dependable value. It has no particular absolute meaning, but it can be interpreted in conjunction with other readings. For example, there is no neutral value of pipe-to-soil potential which indicates, alone, that there is no current flow from or to the pipe. It would be helpful indeed if there were such a value; then whenever a pipe was positive we could say that it was discharging current, and when negative that it was receiving current. Unfortunately, this is not the case; the interpretation of potentials is not easy or simple.

Yet there is a great deal of information which can be obtained from these potential readings. *Most of the useful information can be had from the relative values of two or more readings.* In subsequent sections we shall discuss how we measure potentials, how they can be interpreted, and what can be done with them. ■

The only chart drive that

During Hurricane "Flossy" all oil production on the Gulf Coast closed down because it was impossible to get out and wind the intermitters. A prototype of the newly announced Rockwell Gas Drive ran constantly through this emergency on a Pure Oil well, off the coast of Louisiana. A number of these drives have also been in successful service in the production regions of Wyoming and Canada operating through two cold weather seasons at temperatures down to −40° below zero. All in all, the new Rockwell Gas Drive has been rigorously field tested for over 2½ years.



Rockwell Gas Drive powers this typical intermitter

FEATURES

- **Powered by gas or air—no winding**
- **Built right into a standard Rockwell chart drive case**
- **Adapts to fit practically any instrument without cutting**
- **Uses only 4 cubic feet of gas in 24 hours**
- **Operating pressure range 15-25 psi**

withstood Hurricane "Flossy"

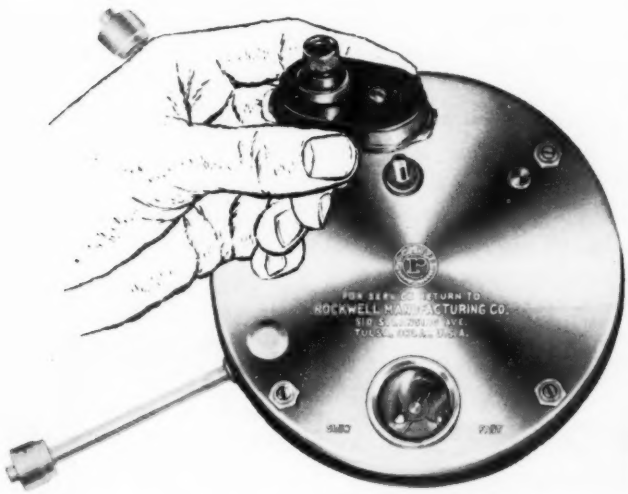
THE NEW ROCKWELL GAS DRIVE

A gas or air powered chart drive for all kinds of recording instruments—completely self-contained, self-starting.

Let's hope you will never need a chart drive that will run throughout a hurricane, but right now you can use the new Rockwell Gas Drive with profit to power remotely located instruments. You can forget the costly chore of periodic winding, for this drive is completely self-powered by the gas (or air) in the flowing stream.

The Rockwell Gas Drive is economical to run—it consumes only 4 cubic feet of gas every day. It's safe, too, for there is no venting problem. And it is built right into the case of a standard Rockwell chart drive and has all the interchangeability features of the spring wound design. It can be neatly fitted into practically any make intermitter, production timing instrument or recorder by using furnished adaptors for position and height. Speed changing turrets, which snap on to the main arbor, provide the utmost versatility in rotation rates. So with a stock of standard Rockwell Gas Drives, plus a selection of economical turrets, you can serve all your instrument needs.

Get full facts by writing Rockwell Manufacturing Company, Instrument Division, Pittsburgh 8, Pa.



The turret on top does the trick.

See how easy it is to convert a Rockwell Gas Drive to any of 10 different rotation rates.

The main arbor on this drive rotates once every 24 hours. Speed changing turrets are available to give 2-hour, 3-hour, 4-hour, 6-hour, 12-hour, 48-hour, 72-hour, 7-day, and 8-day rotation. No special tools or skills are required to convert to different rotation rates; the turrets snap into place.

GAS DRIVES, CHART DRIVES

another fine product by

ROCKWELL

Extra Tough, Extra Durable

AMERICAN Ductile Iron PIPE

For Gas Service

With American Ductile Iron Pipe, there's no need to worry about tough treatment. American Ductile Iron actually bends under stress . . . and has the strength to withstand high internal pressures, heavy crushing loads, extreme shock. It stands up to tough treatment in shipment, in installation, in service.

Produced from a new family of cast metals, American Ductile has steel-like strength plus the proven corrosion resistance of gray cast iron. With American Ductile, there's no inconvenience and expense of special wrappings and other protective devices.

Extra tough, **extra** durable, American Ductile Iron Pipe is manufactured with extra safety factors to meet the super-service requirements of modern gas distribution.

Get full details on American Ductile Iron Pipe . . . its durability, ease of installation and tapping, its bottle-tight American Double-X Mechanical Joint . . . from your nearby American Cast Iron Pipe Company representative now.

GEM

AMERICAN CAST IRON PIPE CO.
BIRMINGHAM ALABAMA

SALES OFFICES
New York City • Dallas
Chicago • Kansas City
San Francisco • Denver
Pittsburgh • Orlando
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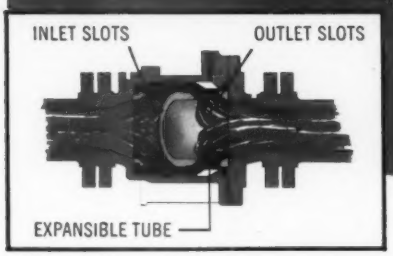
Birmingham

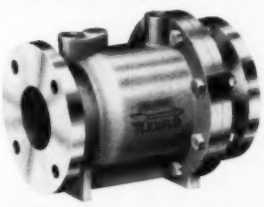


The world's most versatile valve has only one moving part, yet can be used for:

PRESSURE REDUCING
REMOTE CONTROL OPERATIONS
BACK PRESSURE CONTROL
AUTOMATIC SHUTOFF
MANUAL OPEN-SHUT FLOW CONTROL

A single, moving part—an expansible tube of tough, but resilient rubber—serves as both diaphragm and valve. Can't slam . . . the tube rolls on and off the core, assuring remarkably quiet operation. Can't stick or wedge open. The resilient tube seals around foreign matter . . . absolute shutoff every time. Simple design guarantees dependability and minimum maintenance. Highly sensitive with smooth, instantaneous response.

The Flexflo can be adapted for a wide variety of services. May be self-operated or used with electrical, pneumatic or hydraulic-actuated pilots. Can handle gases, water, most petroleum products, and numerous other liquids . . . available in sizes 1" to 12" . . . working pressures to 1500 pounds.



GROVE VALVE and REGULATOR COMPANY
A Subsidiary of Walworth
65th & Hollis Street, OAKLAND 8, California
HOUSTON 27—3203 Mercer St. • LOS ANGELES 6—2559 W. Olympic Blvd.
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FARMINGTON, N. M. • LAFAYETTE, LA. • HARVEY, LA. • LONGVIEW, TEXAS
In Western Canada: GROVE VALVE LTD., EDMONTON

5450

TEX-TUBE Teamwork delivers the

Tex-Tube's reputation for *having the goods* and *meeting its schedules* is not accidental. It is the result of close teamwork between sales-service, warehousing and mill facilities.

The sales department provides continuous and detailed feedback from the field which enables Tex-Tube to forecast pipe needs in the months ahead. This information is used in determining mill schedules and maintaining well balanced stockpiles of line pipe, oil well casing and tubing, and structural and mechanical tubing. At Houston and six other locations in the South and Southwest, every type and size of tubular goods are available—often for immediate shipment to your job.

Tex-Tube's ability to keep *ahead of the market* means dependable, on-time service for you.

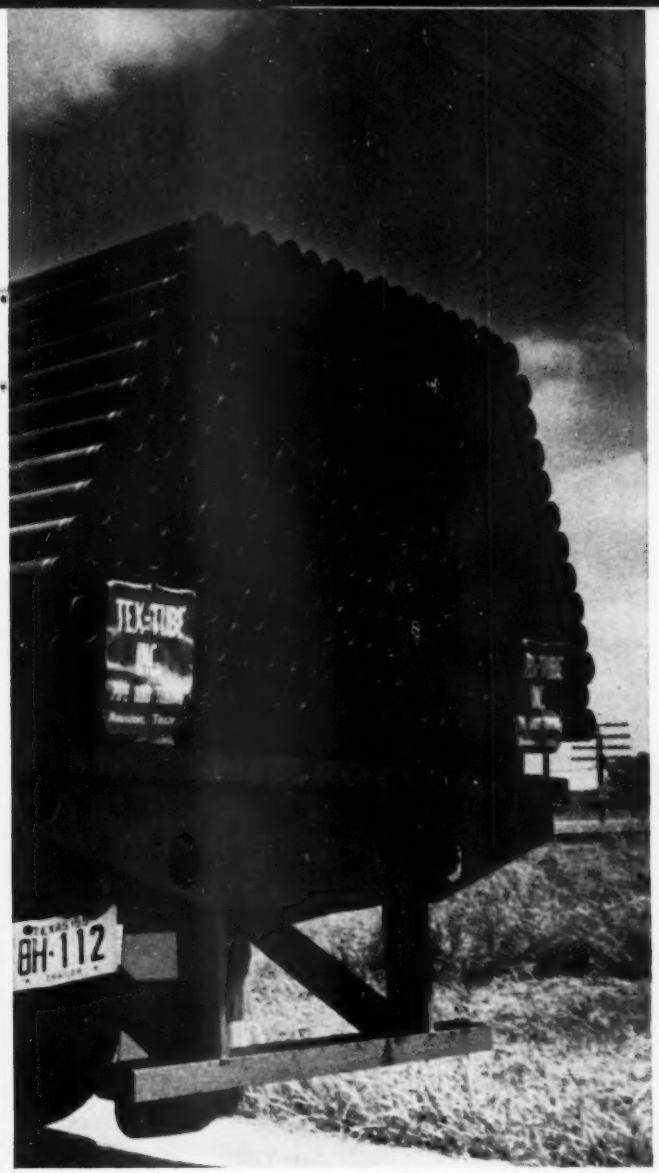
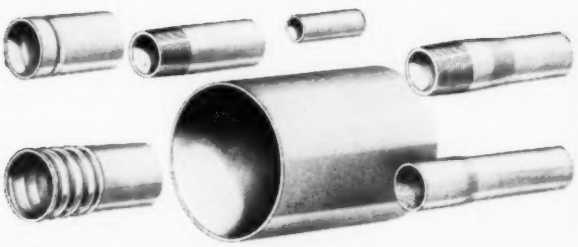


Photo left shows Tex-Tube semi-trailer loaded with 282 joints of 3½" OD grooved tubing. This quick-coupled pipe is made by Tex-Tube for use with Victaulic Company of America couplings.

goods on schedule



TEX-TUBE, INC.

1503 NORTH POST OAK ROAD • HOUSTON, TEXAS

Sales Offices in Midland, Texas—Tulsa, Oklahoma—Dallas, Texas—Los Angeles, California

REG. U.S. PAT. OFF.

SCOTCHRAP

BRAND

PIPE PROTECTION

Tapes are TOUGHER!

Proved by 200-hour torture test!

Each of the five lengths of pipe shown was covered with a different protective coating—both tapes and mill coatings. They were then fastened in a barrel containing abrasive tumbling chips and continually tumbled for 200 hours. This unretouched photo shows the results: only the "SCOTCHRAP" Pipe Protection Tape, far right, survived intact!

This controlled test was designed to measure the resistances of various coatings to backfilling and soil stresses. It clearly demonstrates the superior abrasion and puncture resistance and excellent bond strength you get *only* with "SCOTCHRAP"—the toughest polyvinyl chloride plastic tape. These properties are so superior that with normal care, no protective overwrap is needed. Add the excellent electric properties, and you have the reasons why we believe "SCOTCHRAP" is the best total coating buy you can make.

SEND FOR FREE MANUAL!
New "Tape it Easy" booklet gives application methods, useful specifications, for "SCOTCHRAP" Pipe Protection Products. Write 3M Co., St. Paul 6, Minn., Dept. EAL 109.

FOR **MAXIMUM ABRASION RESISTANCE . . .**
EXCELLENT PUNCTURE RESISTANCE . . .
MAXIMUM RESISTANCE TO SOIL STRESS . . .

PLUS **EXCELLENT ELECTRICAL PROPERTIES**

SPECIFY

REG. U.S. PAT. OFF.

SCOTCHRAP Pipe Protection Products

BRAND

The term "SCOTCHRAP" is a registered trademark of Minnesota Mining and Mfg. Co., St. Paul 6, Minn. Export Sales Office: 99 Park Avenue, New York 16, N.Y. In Canada: P.O. Box 757, London, Ontario.

MINNESOTA MINING AND MANUFACTURING COMPANY
. . . WHERE RESEARCH IS THE KEY TO TOMORROW

3M COMPANY

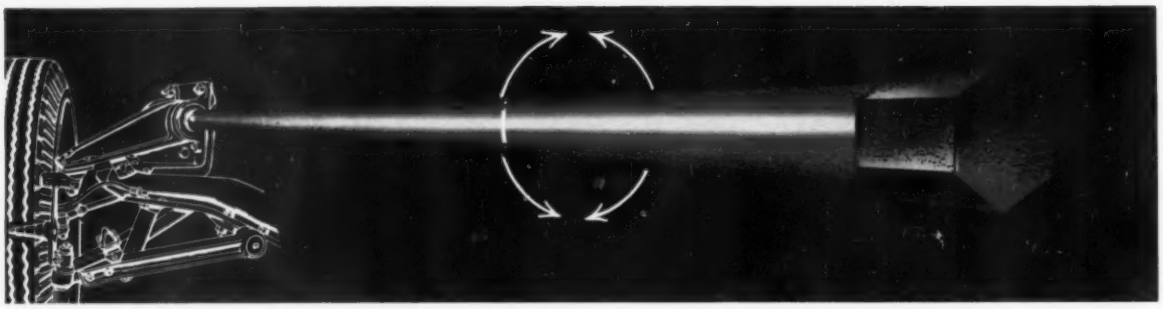
ANNOUNCING

Chevrolet trucks for 1960 with total newness!

Here comes the biggest improvement in trucking in decades . . . a revolutionary improvement that can make any truck route in America a far smoother road to bigger profits for you. Turn the page for the hottest news for truckers since coffee was invented!

new torsion-spring ride!

THE SMOOTHEST THING THAT EVER CAME BETWEEN A ROAD AND A LOAD!



Independent front suspension with tough torsion bar springs . . . for trucks! Years in the making, this totally new suspension system protects everything from bumps and jolts . . . provides a new kind of performance that lengthens truck life, protects cargoes, reduces driver fatigue and cuts maintenance expense to new lows. Independently suspended, each front wheel steps cleanly over bumps. And the friction-free torsion bars work to absorb each jolt or jar; they flex freely, even on the smallest bumps, yet have the capacity to absorb severe shocks. The result is a truck ride so wonderfully smooth that it must be experienced to be believed! And it's now *standard* in *all* classes of 1960 Chevrolet trucks!

Three tailored-to-the-truck rear suspensions complement the revolutionary torsion bar independent front suspension. *In Series 10 and 20 models,* frictionless high-capacity coil springs ease the rear axle over bumps. *In Series 30* and 40 models,* a new two-stage leaf spring provides tailored springing action . . . *and in Series 50, 60, 70 and 80 models,* all-new variable-rate rear suspension gives spring resistance that adjusts automatically to cushion any size load.

**Optional at extra cost.*

Chevrolet trucks for '60

new style, new models!

NEWLY ENGINEERED FOR EXTRA SAVINGS THROUGH EXTRA STRENGTH!

Rolling in on revolutionary torsion springs, these 1960 Chevies are smooth as silk yet tough as nails . . . totally new in scores of profit-boosting ways! In the light-duty class, for example, big new Series 40 chassis-cabs and stakes add to your earning power with G.V.W's up to 14,000 lbs. And virtually every model offers a new lower-to-the-ground build (without sacrificing road clearance) which improves truck stability and makes cab entry easier. In the big-truck class, too, Chevy for '60 sports big-profit G.V.W.'s – up to 19,500 lbs. in middleweights and 36,000 lbs. in heavyweights – with stronger components including new frames with more massive bracing and brawnier side rails, new bigger brakes, and the latest in low-cost V8 or 6-cylinder power.

New Comfort-King Cabs! There's more comfort than ever before, with 5 inches more shoulder room, 6 inches more hip room and more leg room and head room, too! A new wider seat, combining S-wire, coil and flat spring elements, offers a new high in easy riding. And Chevy's new double-walled cowl and new double-panel roof construction provide extra ruggedness and long life.

New custom cabs! Available in all 1960 cab models, they include distinctive exterior door pillar and rear belt line moldings . . . handsome chrome grille (light-duty models) . . . new Super Cushion Seat with foam seat cushion and backrest . . . sunshade, armrest, cigar lighter and control knob trim.

New compact L.C.F. models! Twenty-six new Chevrolet Low Cab Forward models with short cab design allow for maximum length trailers and extra cargo space. Short wheelbase and turning radius give exceptional maneuverability. Bumper-to-back-of-cab dimension is as short as 90 inches. G.V.W.'s go up to 25,000 lbs. and new cab design makes entering easier. And in series 50 and 60 models you can choose 6-cylinder or V8 power.

New tougher built tandems! They're the best built Chevy tandems yet with Hendrickson RT320 rear suspension, two 16,000-lb. Eaton rear axles and 7,000-lb. front suspension (9,000-lb. front suspension optional, extra cost).

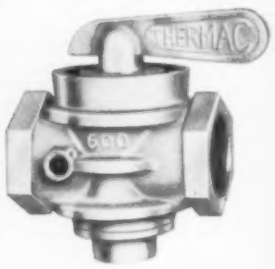
And they're POWERED to improve your profit picture, too! Chevy for '60 offers a *wide* choice of better-than-ever power plants; in every weight class you can choose from famous economy 6's or V8's that lead the field for efficient short-stroke design! Three big sixes and four advanced V8's allow you to match the engine to your job for top performance.

Chevy's 1960 trucks with *total newness* are now on display at your Chevrolet dealer's, so stop by sometime soon! . . . Chevrolet Division of General Motors, Detroit 2, Mich.

CHEVROLET

with total newness!

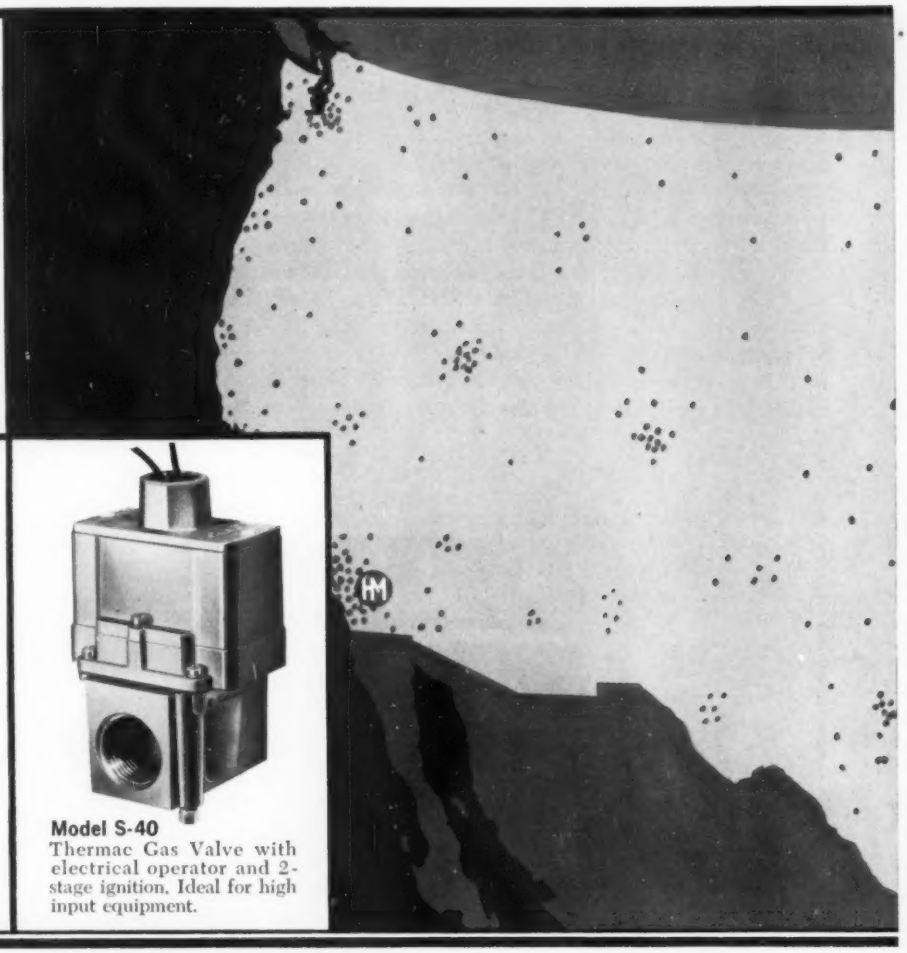
THERMAC GAS CONTROLS
the complete line



Model 600
Thermac manual gas shut-off valve.

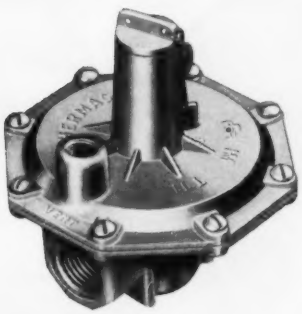
Model SLS 421
Thermac's new Gas Control with smooth, silent controlled ignition combining regulator, safety and automatic main control valve.

Model S-40
Thermac Gas Valve with electrical operator and 2-stage ignition. Ideal for high input equipment.



Whatever your gas control requirements—your Thermac representative has the answer! For 27 years Thermac has supplied the leading gas appliance and furnace manufacturers with the finest quality gas control equipment. With the construction of new manufacturing facilities and research laboratory, Thermac is now better able than ever to produce controls on a mass production basis at a lower cost per unit. The consumer demand for new quiet, automatic combination units makes efficiency and economy increasingly important in the production of gas control equipment. For expert engineering and manufacturing . . . service-free performance . . . low cost . . . prompt delivery . . . *specify Thermac gas controls.*

nationally accepted!



Model T-11
Thermac Gas Appliance Regulator.

Model SL 200
Thermac combination Pressure Regulator and thermo-electric safety.

Model SLS-121
Thermac Safety Regulator with Flow Interrupter in combination with quiet automatic main gas valve.

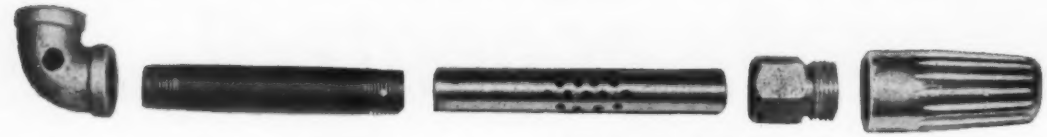
THERMAC
HM
COMPANY

Certified by A.G.A.

The controls shown here are only representative of Thermac's products. For a catalog of the complete line—or test samples—write Thermac today!

"27 years' experience building gas controls"
14296 East Sixth Street Corona, California
REdwood 7-3511

Here's POSITIVE PROOF



Epi-SEAL

(EPOXY COMPOUNDS)

makes any leak "gas tight"

Above photo shows ¼" hole in fitting, hand-tight threads, holes in pipes, steel and copper with ends separated—joined together and made "gas tight" (CO_2) at 650 psi with versatile Epi-SEAL Repair Kit.

The Epi-SEAL Repair Kit revolutionizes service repairs. Whether it be a corroded section — leaking threads at a fitting, valve or plug cracks, breaks, holes (even in fittings)—steel pipe or copper tubing; all can be made "gas tight" with a safety factor of 5 to 1, even on high pressure systems, with the contents of this kit.

How else could such repairs be made — and with such simplicity, speed and economy? No need for special tools or skills . . . no worry about size, exact fit and later corrosion. All you require is in the Epi-SEAL Repair Kit. Compact enough to take little space on trucks, cars or tool carts — versatile enough to replace a truckload of fittings, clamps and tools for the variety of sizes and types necessary to fix all kinds of leaks.

Epi-SEAL Repair Kits are low cost and assure fast, economical and lasting repairs . . . a must for *every* truck, car and tool cart. Order your Kit *TODAY*.

The Epi-SEAL Service Kit contains more than enough material to complete *12 different repair jobs*. Kit contains: resin, glass tape, 2 types of reinforcers, stirrers, brushes, gloves, sandpaper, wire brush, solvent as well as complete instructions. Size: 6" high — 11" wide — 16" long.

BONDED

BONDED PRODUCTS, INC.

Formulators and Manufacturers of Resinous Products for the Gas Industry

404 South Jefferson Street • Orange, New Jersey

all new...
all diesels...
all from
FORD...

For economy, dependability on the big jobs

Gallon-an-hour fuel scrimper. Operates for pennies an hour, dimes a day!

Max. corrected brake H.P. (less accessories @ 1700 rpm; manufacturer's rating) ..... 54 H.P.
Engine displacement ..... 220 cu. in.
Number of models 4
Transmission ..... 6 speeds forward, 2 reverse
Available without hydraulic system ..... Yes
Front tires ..... 7.50 x 16
Rear tires ..... 12 x 38 and 14 x 30
Wheelbase ..... 80″
Turning radius, brake locked (w/58″ min. tread) ..... 12′1″
Height to top of steering wheel ..... 63″
Overall length ..... 130.5″
Overall width, maximum ..... 85″
minimum ..... 65″
Min. ground clearance (drawbar) ..... 12.75″
Factory installed options include: Power steering, raised or "live" power take-off, automatic clutch release, belt pulley and horizontal muffler.
Typical working weight with front and rear tire fill, front and rear wheel weights ..... 7361 lbs.

FORDSON
POWER MAJOR DIESELS

And for peak productivity on industrial jobs

Direct injection fuel system with automatic timing for peak power, peak savings on fuel!

Max. corrected brake H.P. (less accessories @ 2200 rpm; manufacturer's rating) ..... 56 H.P.
Engine displacement ..... 172 cu. in.
Number of models 5
Transmission options ..... 4-speed, reversing, "Select-O-Speed"
Available without hydraulic system and power take-off ..... Yes
Front tires ..... 7.50 x 16—8 ply
Rear tires ... 12 x 28, 13 x 24, 13 x 28 and 14 x 24
Wheelbase ..... 81.5″
Turning radius, brake locked (w/54″ min. tread) ..... 9′6″
Overall height (14 x 24 rear tires) ..... 57.72″
Overall length (14 x 24 rear tires) ..... 128″
Overall width (14 x 24 rear tires) ..... 71.38″
Factory installed options include: Equipment Hydraulic Package, 28″ cast iron rear wheels (1200 lbs.), and the new "shift-on-the-go" Select-O-Speed.
Weight with 28″ tires ..... 3800 lbs.
Weight with 28″ tires and cast wheels 5000 lbs.

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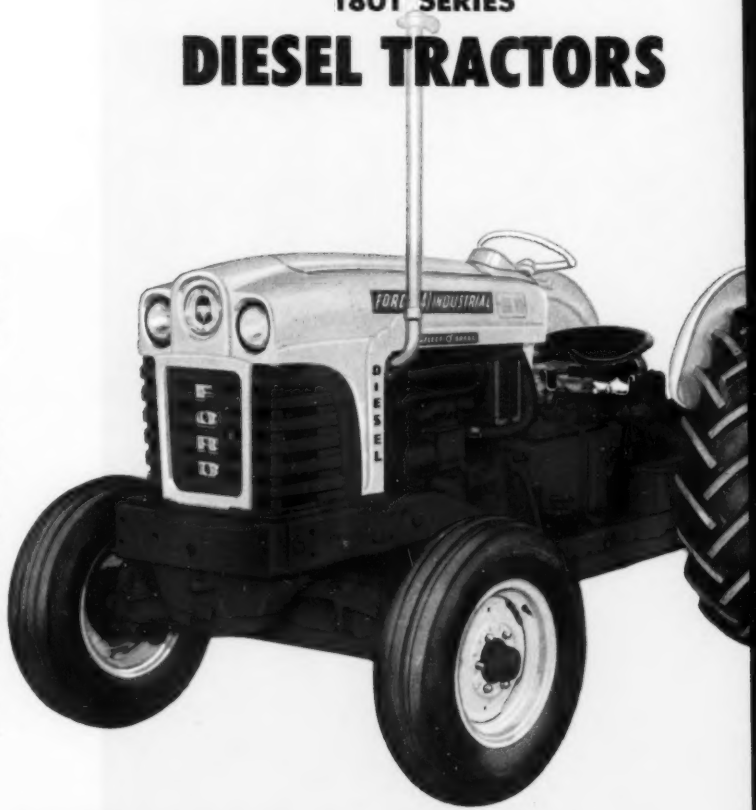
FORD
1801 SERIES
DIESEL TRACTORS



TEAR OUT FOR HANDY REFERENCE

For rock bottom original cost

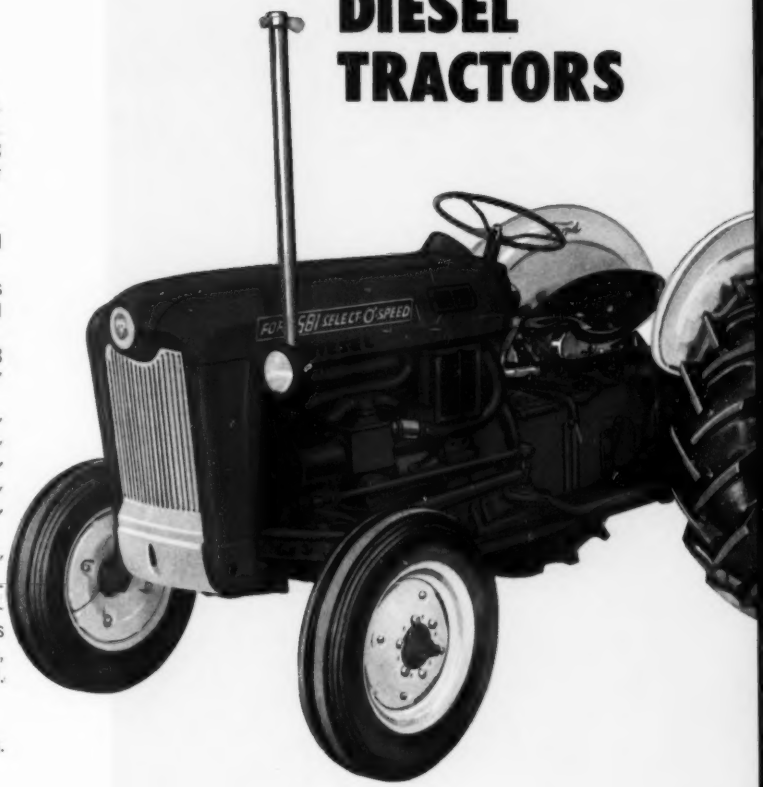
***Lowest* cost diesel tractors in their power class!**

Max. corrected brake H.P. (less accessories @ 2200 rpm; manufacturer's rating) ..... 41 H.P.
Engine displacement ..... 144 cu. in.
Number of models 8
Transmission options ..... 4 or 10-speed "Select-O-Speed"
Heavy duty front end with industrial clutch ..... Optional
Available without hydraulic system and power take-off ..... Yes
Front tires ..... 5.50 x 16 (6-ply 6.50 x 16 and 7.50 x 16 for HD front end)
Rear tires ..... 10 x 28 and 11 x 28
Wheelbase at 52" front tread ..... 74.50"
Turning radius, brake locked (w/52" min. tread) ..... 8'11"
Overall height w/11" rear tires ..... 56.15"
Overall length at 52" front tread ..... 120.83"
Overall width at 52" tread ..... 63.88"
Overall width at 76" tread ..... 87.50"
Min. ground clearance (under transmission case) ..... 13.22"
Factory installed options include: Power steering, power adjusted wheels, auxiliary over-under transmission which provides 12 speeds forward when used with 4-speed transmission, and new "shift-on-the-go" Select-O-Speed.
Typical working weight with front and rear tire fill, front and rear wheel weights ..... 4716 lbs.

FORD

601 SERIES

DIESEL TRACTORS



For big power requirements

Extra lugging ability, fuel economy. Quick starts even in zero weather!

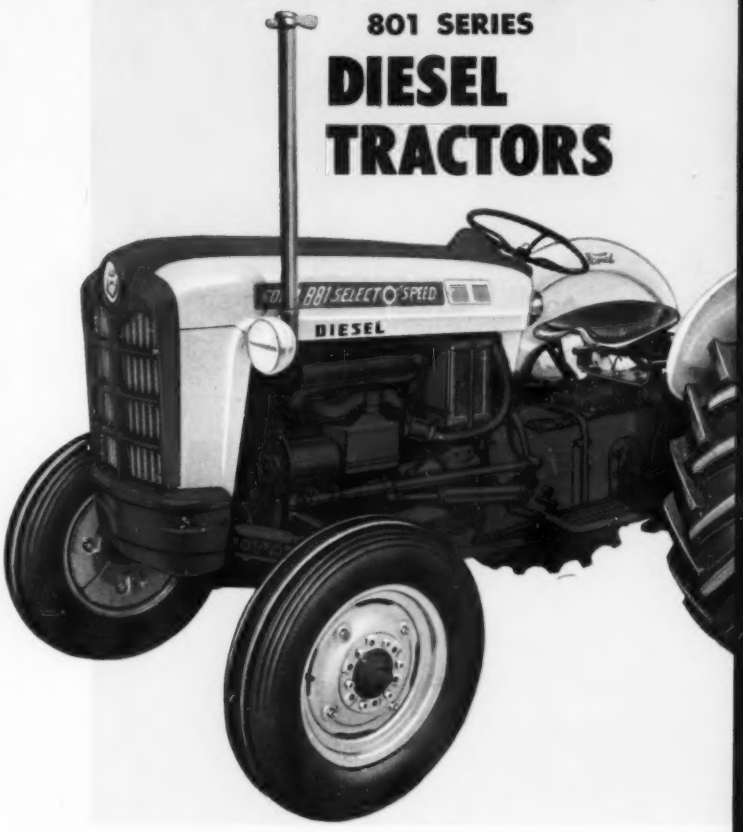
Max. corrected brake H.P. (less accessories @ 2200 rpm; manufacturer's rating)	56 H.P.
Engine displacement	172 cu. in.
Compression ratio	16.8 to 1
Number of models	7
Transmission options	4 or 10-speed "Select-O-Speed"
Heavy duty front end with industrial clutch	Optional
Available without hydraulic system and power take-off	Yes
Front tires	6.00 x 16
Rear tires	10 x 28, 11 x 28 and 12 x 28
Wheelbase at 52" front tread	74.50"
Turning radius, brake locked (w/52" min. tread)	8'11"
Overall height w/12" rear tires	57.29"
Overall length at 52" front tread	120.83"
Overall width at 52" tread	63.88"
Overall width at 76" tread	87.50"
Min. ground clearance (under transmission case)	13.98"

Factory installed options include: Power steering, power adjusted wheels, auxiliary over-under transmission which provides 12 speeds forward when used with 4-speed transmission, and new "shift-on-the-go" Select-O-Speed.

Typical working weight with front and rear tire fill, front and rear wheel weights ..... 5617 lbs.

FORD

801 SERIES DIESEL TRACTORS



ALL NEW FROM FORD FOR '59

- **For any power job**—Utility, All Purpose and Industrial tractors, gasoline or diesel.
- **For any mowing or maintenance job**—Dozens of man and money-saving implements and attachments, including many specialized tools matched to Ford.
- **For any digging job**—10 ft., 12 ft. and 14 ft. backhoes with bucket and stabilizer pad options for all kinds of digging.
- **For any loading job**—Heavy Duty, Extra Heavy Duty and Super-Duty Loaders with 1000 to 2500 lb. rated capacities.

Design, materials and or specifications are subject to change without notice and without liability.

Ford industrial tractors and equipment can help solve problems, beat schedules and save money on your job, too. Why not talk to your nearby Ford Tractor and Equipment Dealer about easy credit terms? Get full details on all of Ford's new industrial line for '59, on the exciting new Select-O-Speed transmission. See him today, or write Industrial Sales Department, Ford Motor Company, Birmingham, Michigan.

YOU SEE MORE FORDS BECAUSE THEY SAVE MORE MONEY!

TEAR OUT FOR HANDY REFERENCE

PRINTED IN U.S.A.

SPOTTY HEAT
The old fashioned wood or coal-burning stove generated plenty of heat but most of it was wasted . . . went straight up the flue. To keep warm, you kept close.

BASIC . . . but better than ever today

WARMTH WHEREVER YOU ARE . . . Thanks to modern gas distribution gas heat is evenly distributed, instantly available and responsive . . . comfort at the touch of a thermostat.

Two of the many features of cast iron pipe that make it ideal for expanding gas systems are its established quality and dependability. To provide both, U. S. Pipe controls every production step. From mining of raw materials to finished product, all U. S. Pipe is checked and rechecked for quality. This added care and precision in manufacture is one more reason for U. S. Pipe performance and dependability in service. Where it counts!

SERVICE IS BUILT INTO CAST IRON

- Standardized mechanical joints are bottle-tight for usual gas distribution pressures . . . and for all types of gas.
- Centrifugally cast pipe is tough, strong and uniform.
- Joint design allows for deflection during and after installation.
- Service connections are easily made.
- Long life a matter of record.
- No shortages. Cast iron pipe is immediately available.

U.S. cast iron PIPE
CAST IRON

U. S. PIPE AND FOUNDRY COMPANY
General Office: Birmingham 2, Alabama

GEM Sponsor

A WHOLLY INTEGRATED PRODUCER
FROM MINES AND BLAST FURNACES TO FINISHED PIPE.

THIS JOB DEMANDS CONSTANT PRESSURE, TOO: Air powered drilling machine (below) drills gas mains under line pressure for installation of stopper plugs. The unfluctuating 100 psi maintained by the Jaeger rotary insures the accurate cut essential for proper seating of the plugs.

Steadier pressure stops drill deflection, does job 2 to 3 times faster

When running service lines under roads and streets, auger drill deflection caused by fluctuations in air pressure can be a costly problem. On the work here pictured (tunneling 3" holes under 25' pavement, in sand, limestone and blue rock) deflection had formerly made it necessary to drill 2 to 3 times to complete each hole.

Changing to a Jaeger rotary compressor stopped this loss. "*Not only is drill penetration 10% to 20% faster than with any compressor we had previously used,*" foreman Fred Ball states, "*but where it used to be necessary to drill 2 to 3 times, once is now enough. This saving of half to two-thirds of the drilling, and the faster penetration averaging a foot per minute, both result from the consistent air pressure maintained, regardless of soil condition, by our Jaeger rotary.*"

"*We change oil in the compressor unit every 500 hours and every 100 hours in the engine. No oil is added between changes. We average 2 gallons of gas in 8 hours. This Jaeger has been used 550 hours and we think it is the best compressor we have ever owned.*"

• • • • • • • •

Jaeger rotaries have great advantages for utility work. Their constant pressure holds tools at top efficiency; their slower speed of operation gives you lowest fuel and upkeep costs. Full load speed is only 1700 rpm compared with usual 1800 rpm and even as high as 2150 rpm in other makes. Two-wheel mounted 85, 125 and 250 cfm models have full-size tool boxes, wrap-around bumpers, retractable pneumatic tired third wheel and 8-hour fuel tanks as standard equipment.

For complete cost-saving data and demonstration, call your Jaeger distributor — or send for Catalog JCR 8.

JAEGER
MACHINE COMPANY
661 Dublin Avenue, Columbus 16, Ohio
Jaeger Machine Company of Canada, Ltd.,
St. Thomas, Ontario

In Chicago... they use the modern method of service replacement

PEOPLES GAS replaces service lines with tubing of Tenite Butyrate plastic

Since 1952, The Peoples Gas Light and Coke Company of Chicago has used more than 300 miles of Butyrate tubing to replace approximately 23,000 metal services.

This utility, which supplies gas to over one million meters, adopted Butyrate plastic tubing, in 20-foot lengths, only after extensive testing, which carefully assessed tensile strength, bursting strength, resistance to crushing and resistance to gas-borne solvents.

Throughout the country, according to a recent GAS survey, the biggest percentage of service line inserts were made with pipe of Butyrate plastic. There are good reasons for this!

Butyrate tubing provides a quick, clean, and economical method of natural gas service replacement. Holes are dug only at the main tap and service riser, with the new flexible plastic service inserted right through the old metal pipe. When used in continuous coils, the Butyrate service replacement can be a single piece of tubing without any joints. Stock fittings can be used for plastic to metal connections.

In addition, tubing of Butyrate is virtually non-corrodible and an excellent dielectric. And it costs about half as much as soft-metal tubing.

Over a decade of use has proved the many benefits of Tenite Butyrate for natural gas service. Get more facts today. We will be happy to send you additional information about the tubing, its fittings and installation, plus the names of suppliers near you. EASTMAN CHEMICAL PRODUCTS, INC., subsidiary of Eastman Kodak Company, KINGSPORT, TENNESSEE.

A 16mm. sound-color film, "Plastic Pipelines," is available upon request.

TENITE
BUTYRATE
an Eastman plastic

CLEVELANDS STRETCH

BUDGET DOLLARS

longer work life

lower distribution costs
year after year

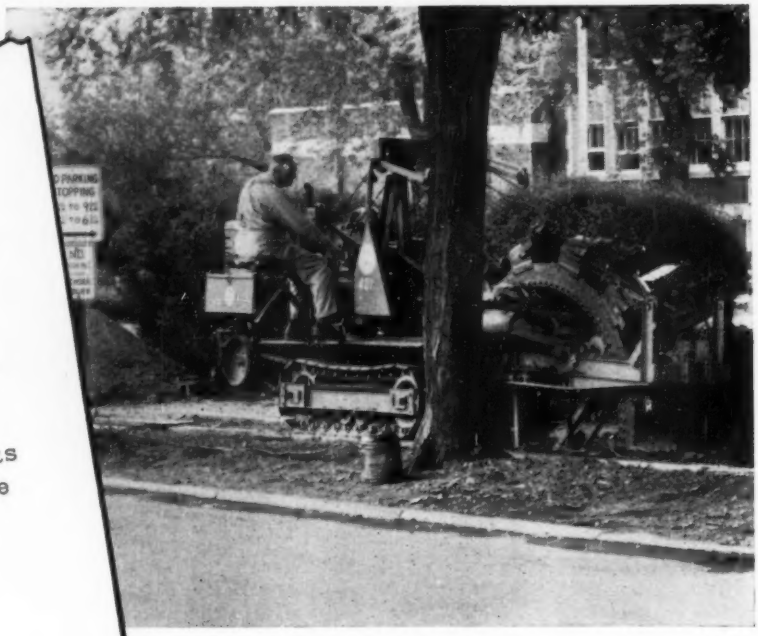
check latest improvements
on entire Cleveland line

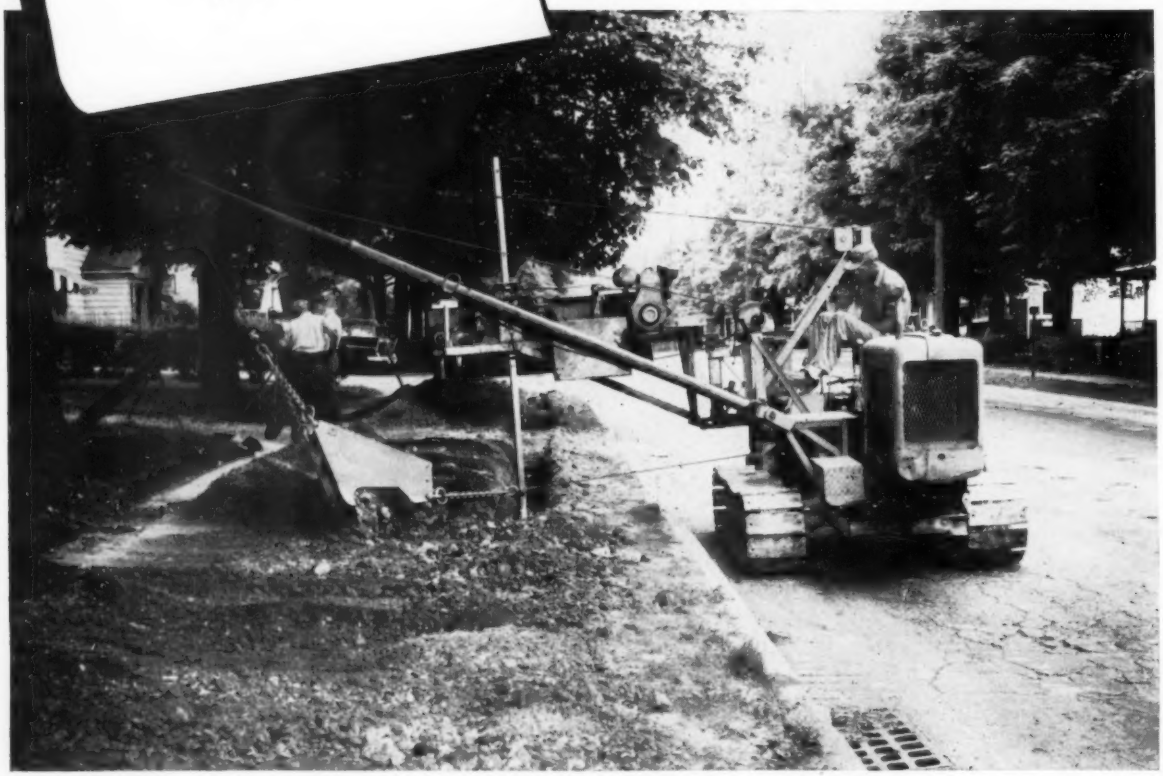
trenchers

backfillers

pipelayers

tampers





Good Everywhere

The CLEVELAND TRENCHER Co.

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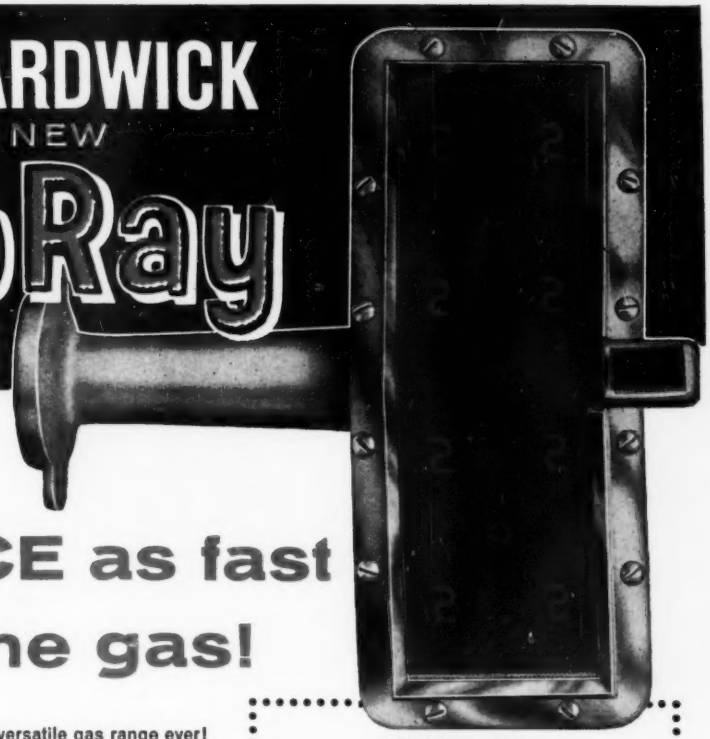
GEM

NOW! FROM HARDWICK

FABULOUS, NEW

MicroRay RANGE



cooks TWICE as fast with HALF the gas!

New! Hardwick brings you the most exciting, versatile gas range ever! The beautiful new Hardwick MicroRay range with EquaFlo Baking Oven plus a new giant second oven with the revolutionary MicroRay burner — that allows you to broil, roast or barbecue with unbelievably fast, efficient, 3-micron heat waves. Thermostatically controlled live flame rotisserie. Other foods can be cooked simultaneously in the conventional EquaFlo Oven. MicroRay! A new era in gas cooking!

ADVERTISED IN McCALL'S LADIES' HOME JOURNAL BETTER HOMES & GARDENS

WHAT IS MicroRay?

- ***NEWEST**—MicroRay contains ceramic ports—the first to be introduced in a domestic range. Offered only by Hardwick.
- ***FASTEST**—MicroRay cooks twice as fast with half the gas. So much more economical to operate.
- ***FINEST**—Sears foods quickly, sealing in natural juices and producing tenderer, juicier, more delicious foods.
- ***CLEANEST**—Cuts spatter and drip as much as 50%!
- ***COOLEST**—High luster aluminum, lining the MicroRay Meat Oven, reflects 80% of the heat rays back to food, keeping exterior of range cool.

MicroRay

only Hardwick has it!

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NO. G-59-10

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These famous trademarks...

identify the quality products of companies that are helping the Gas Industry through the GEM program of national advertising.

All suppliers to the Gas Industry are invited to help the Gas Industry grow and prosper by joining GEM. Write GEM Committee, Room 2925, 60 East 42nd Street, New York 17, N. Y.

As the Gas Industry grows, so will grow the business of everyone selling to it.

FOR GAS MEN ONLY!

POWERS American

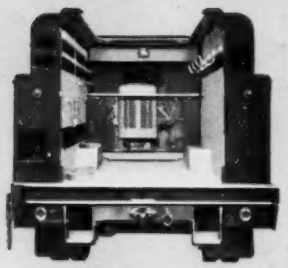
SERIES 850-C

Gas Line Construction and Maintenance Body

Looks like a streamlined warehouse on wheels doesn't it? And, why not—for that's what it is. The 850-C is designed to carry everything (including air) needed for any gas construction or maintenance job. That means plenty of room for hand and pneumatic tools, pipe and fittings, parts and welding equipment . . . name it, and there's a place to carry it in the Series 850-C.

There's plenty of room for a seven-man crew, too—four in the comfortable crew compartment that's part of the body, and three in the truck cab.

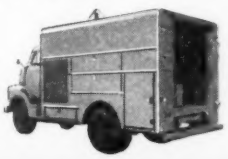
Bodies can be furnished in lengths ranging from 12'3" to 14'3" . . . or without crew compartment in 9' to 12'6" lengths . . . equipped specifically for your job.



Air compressor . . . driven by truck engine through a power take-off, or gasoline-powered . . . can be supplied—with air receiver — in capacity desired.

Hose reels, holding 50 ft. of ¾" high pressure air hose, are installed in lower rear compartments . . . pay-out and take-up hose through openings at rear of body.

CUSTOM-MADE JUST FOR YOUR OPERATION, TOO! Powers-American Series 850-C Bodies, and other standard bodies in the line, can be modified to fit your requirements. Powers-American quality and workmanship is also available in tailor-made bodies . . . built to your specifications or designed by our engineers to meet your specific work needs. Shown here are a few of the hundreds of specially-designed bodies serving operating companies throughout the United States and in many foreign lands.



Descriptive Bulletin No. 206, complete with price information, is yours for the asking.

McCABE-POWERS BODY COMPANY

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625 CEDAR STREET BERKELEY 10, CALIF.

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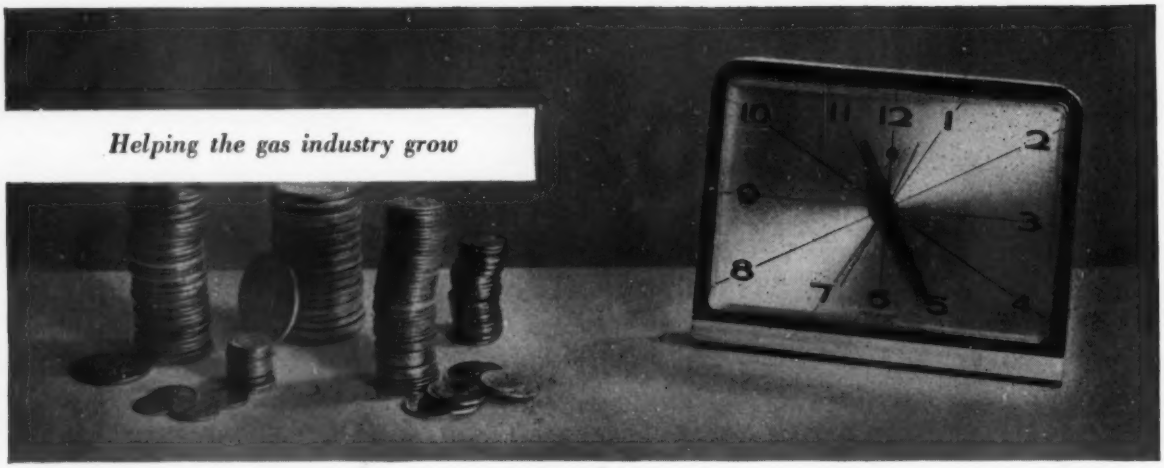

One eye on the budget, the other on the clock

Budget and schedule are key factors in the successful completion of most gas main and pipeline projects. United Engineers is at its best in handling or participating in Distribution Department projects where costs and time schedules must be tightly controlled. We offer engineering, construction, construction supervision, and inspection services. Our forces and functions are flexible, adjusting to meet your needs.

Our numerous gas industry assignments and our many new projects for clients previously served speak for the caliber of our performance. We invite you to share and profit from our background of 75 years' experience.

United Engineers Offers—

Experience in Design
Seventy-five years in gas industry construction

Efficient Apparatus and Processes
Through constant research to develop thermal and catalytic apparatus and processes for gas production

Economical Construction
A big, well-organized force for natural and manufactured gas production work

Experience in Operation
A highly skilled plant operations staff to obtain most efficient results from apparatus

UNITED ENGINEERS

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CAP FORGED STEEL

INSULATING UNION

GREATER SAFETY • FEWER REPLACEMENTS

ENGINEERED—TESTED—PERFORMANCE-PROVED

for gas service

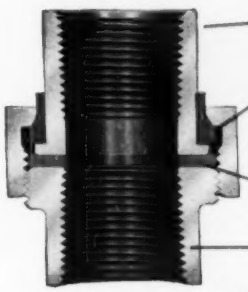
Each year, more corrosion engineers specify CAP Insulating Unions for their meter installations. These are necessary to assure maximum service from pipe and equipment. Insulating unions prevent corrosion caused by electrolysis.

Both the Capitol *Special* and *High Temperature* insulating unions are engineered specifically for gas service—performance-proved by years of service without a single failure—tested for assured quality control.

The *Special* insulating union is recommended for normal applications and will withstand up to 250° F (external heat). The *High Temperature* insulating union will withstand 450° F for one hour (the temperature at which solder in the meter will melt). The *High Temperature* union is designed for maximum protection against a gas leak in the event of a fire.

Only CAP gas service insulating unions have all of these features:

- Forged Steel construction—eliminates danger of sand holes or porosity.
- Exclusive Heavy Tapered Insulation—make connections 3-times stronger than light square type.
- Color Coded—for easy identification by service crews . . . orange for *Special* . . . yellow for *High Temperature*.
- Black oxide coated to prevent rusting.
- Two-thirds insulating unions, *Special* and *High Temperature* are available.


ALL FORGED STEEL for maximum tensile strength—no porosity—no sand holes.
TAPERED INSULATION assures 3-times stronger connections than light square type.
INSULATING is tested and proved effective, long-lasting.
NATIONAL PIPE TAPER for tighter joints.

Add to the life of your company's piping and meters by using CAP Insulating Unions on all installations.

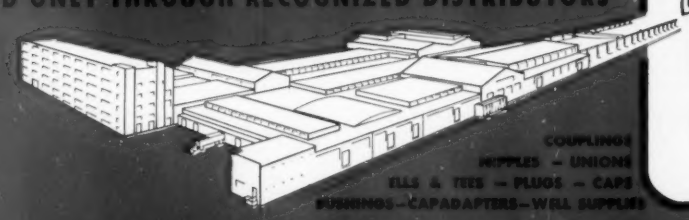
CAP *Special* and *High Temperature* Insulating Unions

Size	Overall Dimensions	Special Part No.	High Temp. Part No.	Quantity in Carton	Approx. wt. per 100
¾"	2.27"	GS-33	GHT-3	20	72#
1"	2.89"	GS-44	GHT-4	12	110#
1¼"	2.96"	GS-55	GHT-5	10	150#
1½"	3.07"	GS-66	GHT-6	5	220#
2"	3.48"	GS-77	GHT-7	5	340#

CARTONED:

Packaged in small cartons for easier handling, better protection, save time and reduce inventory losses.

SOLD ONLY THROUGH RECOGNIZED DISTRIBUTORS



COUPLINGS
NIPPLES — UNIONS
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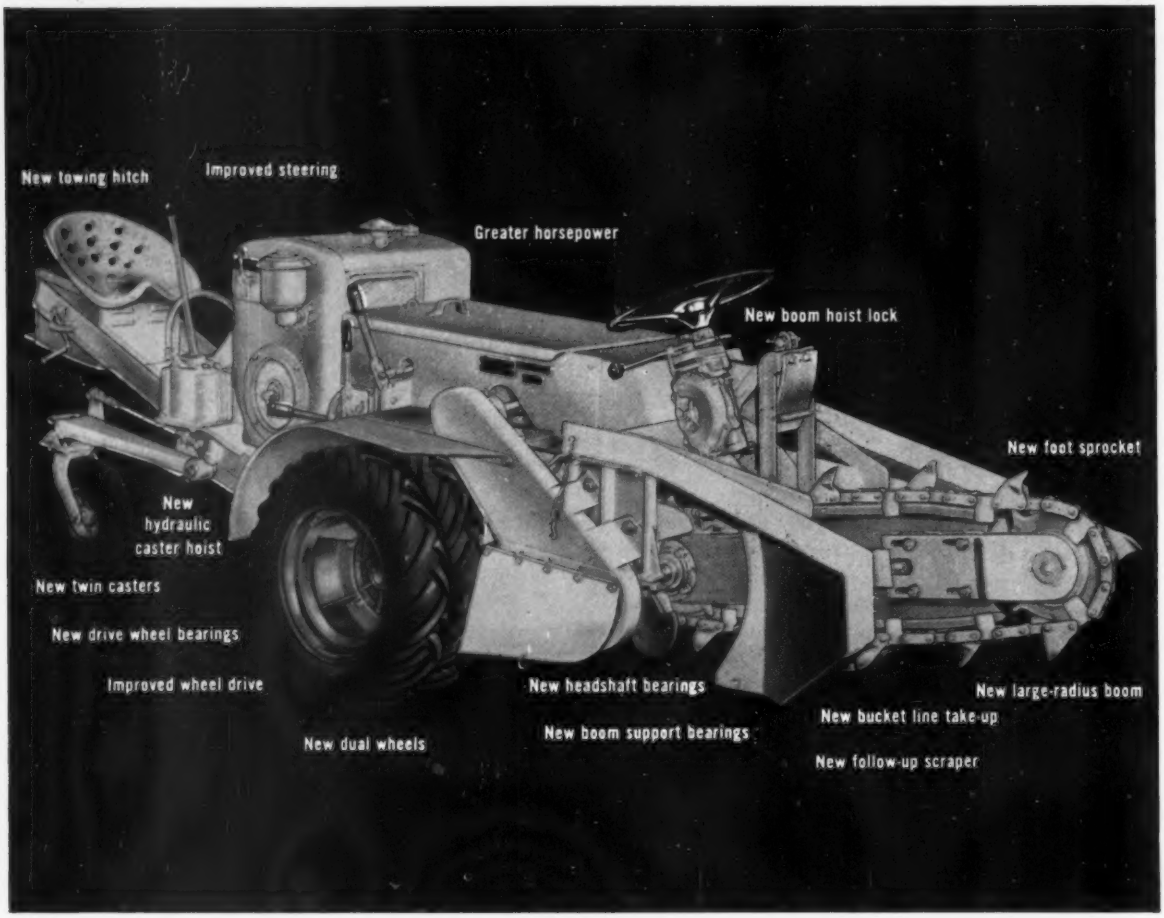
BUSHINGS—CAPADAPTERS—WELL SUPPLIES

CAP CAPITOL

MANUFACTURING CO.
DIVISION OF HARSCO CORP.
COLUMBUS, OHIO



No other ditcher equals the new 702-A for electrical, plumbing and excavating contractors, railroads, utilities, telephone companies, and government bodies. Write for literature.

Easier operation, reduced maintenance, greater maneuverability with

New Barber-Greene 702-A Ditcher

New cost and performance records for underground placement of gas, water, electric and telephone services, sprinkler systems, and all other work requiring narrow trenches were set by the Barber-Greene Model 702 Ditcher. The new Model 702-A offers even faster, more economical digging.

Maintenance costs are reduced by new headshaft bearings, new boom support bearings, new large-radius foot end, and optional foot sprocket. New positive boom hoist lock.

Greater horsepower and new reduced bucket line speed allow digging through tougher materials. New hydraulic caster hoist makes height adjustment easier, more accurate. Optional dual wheels allow machine to operate on unstable bases. Optional electric starter.

The 300% more brake area and improved lever action make steering easier, more accurate. Optional follow-up scraper assures clean trench. New bucket line take-up is readily accessible.

Faster towing with new tapered roller wheel bearings and improved towing hitch. Optional twin casters give better stability and steering, and allow machine to straddle trench.

58-43-D

Write for information on the newest ditcher in the line of advanced design.

Representatives in Principal Cities of the World

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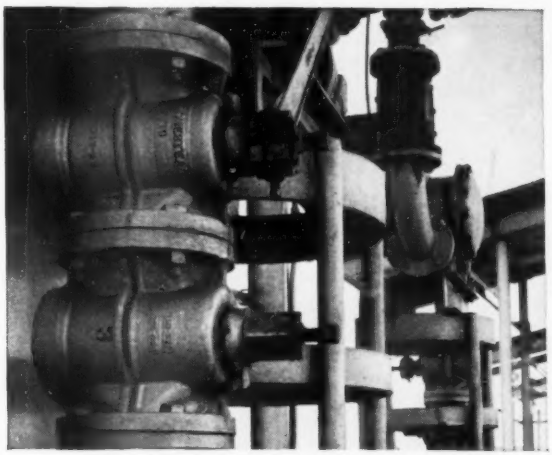
Main Office and Plant AURORA, ILLINOIS, U. S. A.

Plants in DeKalb, Illinois..Detroit..Canada..England..Brazil..Australia

CONVEYORS . . . LOADERS . . . DITCHERS . . . ASPHALT PAVING EQUIPMENT

Homestead Plug Valves Help to Keep Aviation Gas Pure at Naval Air Base, Norfolk



3" Homestead Lubricated Plug Valves handling gasoline on tank truck loading docks at Naval Air Station, Norfolk

Aviation gasoline must be kept free of contamination. That's why fuel lines on truck or ship loading docks, and on underground storage tanks, are so often controlled by Homestead Lubricated Plug Valves.

Controlled pressurized lubrication system and extremely close tolerance between plug and body, prevent lubricant from being extruded into line—prevent contamination of gasoline. Add Homestead's reinforced Teflon* head seal and double ball check valve, and you have a truly dependable plug valve—one that opens quickly and fully for fast loading; closes quickly and tightly for positive fluid control.

Mail coupon today for Reference Books 39-1 and 1A, your complete library on Homestead Lubricated Plug Valves.

Send me new Reference Books 39-1 and 1A on Homestead Lubricated Plug Valves and uses.

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HOMESTEAD VALVE MANUFACTURING COMPANY

Box 405, Coraopolis, Pennsylvania

Adams®
–the most widely imitated pipe clamp in the industry!

Take a second look next time you buy pipe repair clamps . . . and remember this . . . *only genuine ADAMS*® pipe clamps offer you *all* these advantages:

- highest quality
- fastest installation
- surest seal
- longest life
- greatest re-use value

Genuine Adams® clamps are carefully constructed of the finest materials obtainable. They are painstakingly inspected and fully guaranteed as to quality of materials and workmanship in accordance with the Warranty printed in our literature and price lists.

That's why it will pay you to take a second look next time you buy pipe clamps . . . to *make sure you get genuine Adams*® . . . the quality clamp!

WRITE today for complete information.

MAKE SURE you get Genuine Adams® Clamps! Look for the name "Adams" on the band and on the bolthead

Adams® PIPE REPAIR PRODUCTS

2453 Merced Avenue, P. O. Box 3367, South El Monte, Calif. • Eastern Warehouse: Columbia, Penna.

"This is the range I want . . .

It has the new FLAME SET* 'burner with a brain'

". . . and what a *difference* it makes. With this new FLAME SET feature I can adjust the burner flame to suit any size pan! Large or small!

"Say I were going to melt chocolate. I'd need a small pan *and* a small flame to make sure the chocolate doesn't burn. With FLAME SET, I can dial this new 'burner with a brain' to give me the low flame I need. This way I get even temperature-controlled heat and *no* burning. Let's call the salesman."

VMA 63498 *TRADE MARK

From Robertshaw, inventors and pioneers of the "burner with a brain," comes this new design first—FLAME SET. For more information write: Robertshaw Thermostat Division, Robertshaw-Fulton Controls Company, Youngwood, Pennsylvania.

Robertshaw

CONTROLS

This advertisement published in HOME FURNISHINGS DAILY

Hundreds of Utilities Accepted Our Offer

"FREE TEST THIS NEW HOME GAS FILTER at our expense"

The response has been overwhelming! It has proved to us the great need for this economical gas filter for installation right in the home.

It's the economical way to remove dirt, pipe scale, and other foreign matter from natural gas lines, and keep your customers' appliances operating efficiently.

Thousands are already in use . . . hundreds more are now on test. Why don't you take steps to minimize service calls by stopping dirt—the major source of clogged pilots—right in the home?

Accept our FREE offer

to give you a Staynew Home Gas Filter without obligation. Test it any way you like, and see for yourself its many advantages. All we ask is that you write us on your company letterhead so we are sure the filter goes only to authorized personnel. Address: Dollinger Corporation, 68 Centre Park, Rochester 3, N. Y.

REG. PROTECTOMOTOR U.S. PAT. OFF.

STAYNEW FILTERS

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LIQUID FILTERS • PIPE LINE FILTERS • INTAKE FILTERS • HYDRAULIC FILTERS • ELECTROSTATIC FILTERS • MIST COLLECTORS • DRY PANEL FILTERS • SPECIAL DESIGN FILTERS • VISCOUS PANEL FILTERS • LOW PRESSURE FILTERS HIGH PRESSURE FILTERS • AUTOMATIC VENTILATION FILTERS • NATURAL GAS FILTERS • SILENCER FILTERS

CLAMPING BELL JOINT LEAKS

SKINNER-SEAL

BELL JOINT CLAMP

When you clamp a bell and spigot joint, you want PERMANENCE. In the SKINNER-SEAL Bell Joint Clamp, massive malleable iron construction, gasket SEALED by monel metal band, oversize corrosion-resistant bolts . . . combine to make a tight, lasting, completely reliable installation. Four-page folder with drawings, photographs, specification tables, sent free upon request.

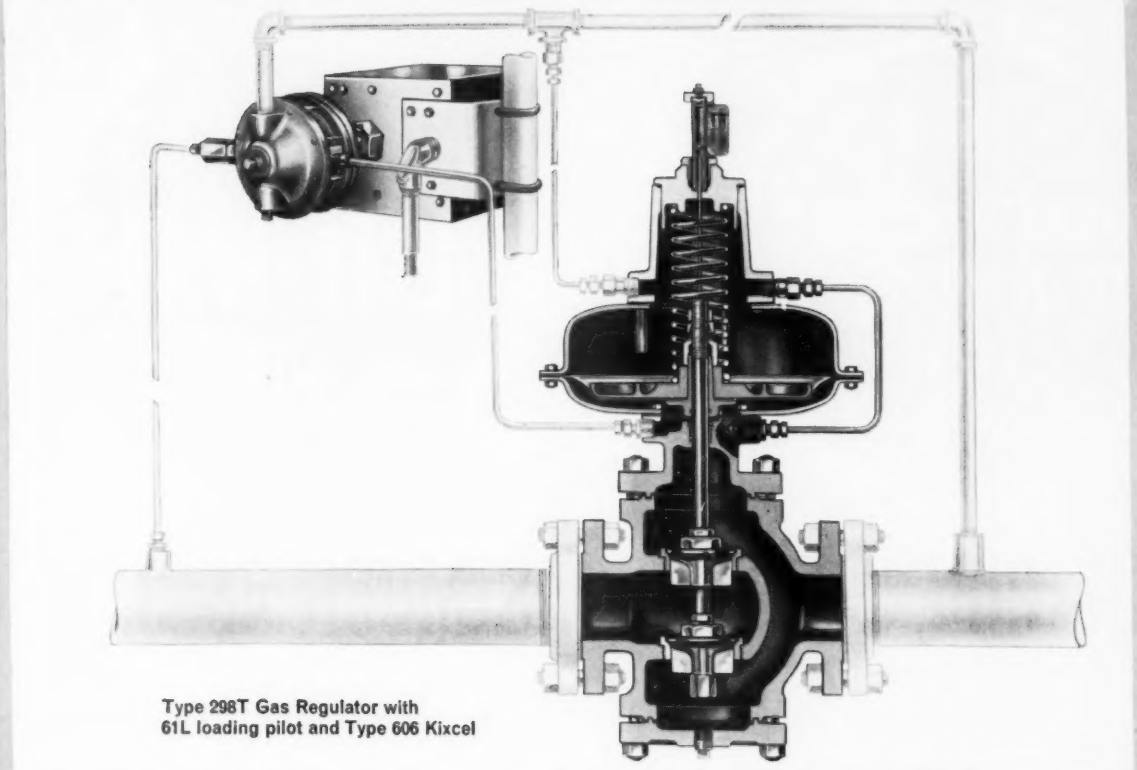
M. B. SKINNER CO., SOUTH BEND 21, INDIANA

Pushbutton PRESSURE CONTROL to meet Changing gas demand

FISHER *TYPE*

- From a remote station Kixcel Type 606 raises or lowers pressure set-point to satisfy change in gas demands.
- High and low pressure limits can be set at any point throughout pilot spring range. (Pressure ranges from ¼ to 2 psi; 2 to 10 psi; 10 to 20 psi; 10 to 65 psi.) Also available for high pressure loading pilots up to 300 psi.
- Quick, easy manual adjustments without changing pressure limit settings.
- Various gear ratios available for different rates of pressure change settings.

IF IT FLOWS THROUGH PIPE ANYWHERE IN THE WORLD... CHANCES ARE IT'S CONTROLLED BY...



Type 298T Gas Regulator with
61L loading pilot and Type 606 Kixcel

606 KIXCEL

Once again Fisher engineering steps in to help the Gas Man provide better service to his customers at the same time achieving greater efficiency at the distribution station.

With fingertip control the Kixcel Type 606 raises or lowers the pressure set-point of the Fisher Type 298T loading pilots even though the central control station is miles away from the regulator station. Kixcel Type 606 is also available for other Fisher pilot operated regulators.

The operator's commands are transmitted by either conventional telemetering control or by a polarized DC signal sent over a pair of telephone wires.

The Kixcel Type 606 is encased in a rugged, weather-proof cover and will withstand all outdoor temperatures.

Write for complete details.

FISHER® Controls
SINCE 1880

FISHER GOVERNOR COMPANY
Marshalltown, Iowa / Woodstock, Ontario / London, England
BUTTERFLY VALVE DIVISION: CONTINENTAL EQUIPMENT CO., CORAOPOLIS, PENNSYLVANIA

CUT PIPE COSTS BY AS MUCH AS 33%

One company (name on request) saved approximately $365,000 in pipe alone by specifying and buying Southern Pipe LITE-WALL pipe. The job called for a 147-mile 6⅝" petroleum products line. By using LITE-WALL pipe, costs were cut by over ⅓.

Why always buy standard-weight pipe when you can now buy LITE-WALL pipe from factory stock. And, besides, it is good business to buy only the steel necessary to do the job.

Southern Pipe offers oil and gas pipe buyers LITE-WALL pipe to cut costs (Southern Pipe also produces line pipe in accordance with the American Petroleum Institute Specifications by means of its new high frequency welding process). Sizes range from 3½" to 14".

The chart below is a section taken from a more complete table found in Southern Pipe's informative LITE-WALL brochure.

LITE-WALL PIPE

AVAILABLE IN 5L Grade A or B, 5LX Grade X-42, X-46

(Area not shaded – indicates API Quality Lite-Wall Pipe)
(Shaded – indicates API Monogrammed Pipe)

Outside Diameter (inches)	Wall Thickness (inches)	Weight Per Ft. (lbs.)	API – 5L Grade B: Safe Working Pressure* (PSI)	API – 5L Grade B: Southern Pipe Test Pressure (PSI)	API – 5L Grade B: Specification Test Pressure (PSI)
6⅝"	.1046	7.29	550	910	—
	.125	8.67	660	1100	—
	.1345	9.32	710	1190	—
	.156	10.82	820	1340	—
	.188	12.89	990	1680	1200

*Type C Construction for 5L Grade B according to Section 8, ASA B31.1.8 – 1955. F=0.5, E=1.0, T=1.0

Write for Southern Pipe's LITE-WALL PACKAGED PIPELINE brochure today.

USI Southern Pipe

DIVISION OF U.S. INDUSTRIES, INC.

P.O. Box C, Azusa, California • CUmberland 3-7111 • EDgewood 7-1221

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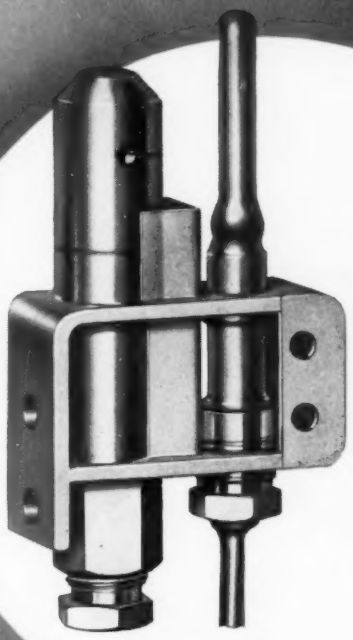
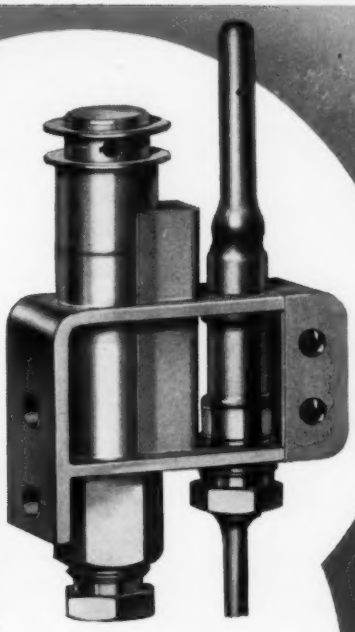
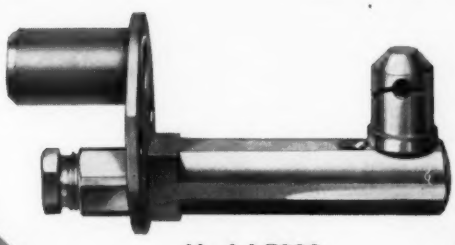


Model D200



Model G200



Model F200

Try **BASO**® *Non-Linting Pilot Burners!*

The New Baso non-linting pilot burners, which are modifications of the reliable series D, F, and G, present the manufacturers of gas appliances a still higher standard of trouble-free performance. Users of these series pilot burners can replace present models with the new units, because the non-linting features can be applied to all D, F, and G pilots.

The modification of these pilot burners reroutes the admittance of air to the pilot burners in such a way that the air passes through the thermocouple flame, causing any air-borne lint to be destroyed before it enters the primary air opening. These pilot burners, therefore, commend themselves to those applications where air-borne lint and dirt are a problem in pilot burner performance.

By applying this feature to these series of pilot burners, vertical, horizontal, or inclined mountings can be made to suit the conditions of any appliance.

Consumption is the same as their earlier counterparts, ranging from 900 to 1,100 Btu./hr. with natural gas at 3″ W.C.

BASO INC.

MILWAUKEE 1, WISCONSIN
Dept. SC-8

A HUSKY HOLAN BODY...

built for your gas construction work

Holan's Model 4154 Gas Construction body is big and husky—built specifically for gas construction and maintenance work.

A nine-man crew—four in the crew compartment, three in the cab and two on the hinged seat in the enclosed body—can ride to the work site in the 4154. Roomy compartments carry lanterns, barricade boards, tools and pipe fittings and three "through" compartments are provided for storage of bars, tamps and shovels. A left side pipe trough with front fender support will carry up to 4" pipes.

The big, roomy 4154 is of all-welded, high tensile construction... your assurance of huskiness without unnecessary weight.

Write to us for complete details . . . or ask your Holan Field Representative about the Model 4154.

Holan Corporation, 4100 West 150th Street, Cleveland 35, Ohio
Plants in: Cleveland, Ohio; Griffin, Georgia; Phoenix, Arizona

Holan

Subsidiary of THE OHIO BRASS COMPANY

HOLAN

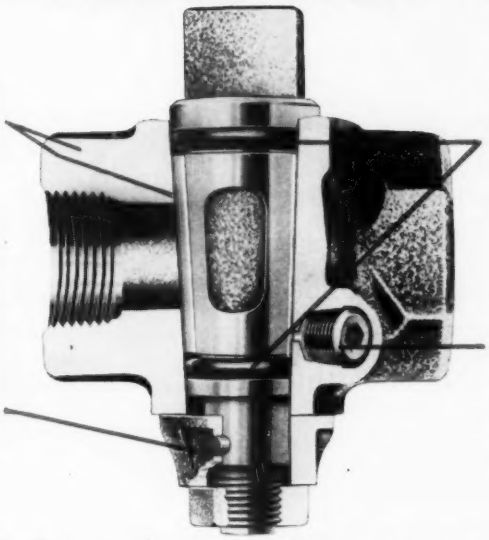
Now . . . a full line!

MUELLER®

125 pound LubOseal® *stops*

Iron body and bronze key—ground and lapped to perfect fit prevents leakage through the port.

Heavy bronze washer secured to key by steel drive-lock pin in blind hole to permanently maintain perfect adjustment between key and body and to prevent tampering. Stop safely operable without nut.



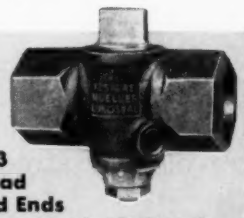
"O" rings at top and bottom of key provide dependable seal to prevent leakage to the atmosphere.

Entire sealing surface and both "O" rings quickly and easily re-lubricated through independent port in body. Assures continuous easy turning.

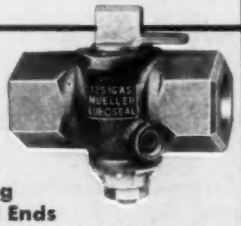
iron body, bronze key—working pressures to 125 psi

H-11170
Plain Head
Inlet: Inside I.P. Thread
Outlet: Inside I.P. Thread
Finish: Black or Galvanized
Sizes: ¾", 1", 1¼", 1½", 2", 2½"

H-11175
Lock Wing
Inlet: Inside I.P. Thread
Outlet: Inside I.P. Thread
Finish: Black or Galvanized
Sizes: ¾", 1", 1¼", 1½", 2", 2½"



H-11173
Plain Head
Recessed Ends
Inlet: Recessed Inside I.P. Thread
Outlet: Recessed Inside I.P. Thread
Finish: Black
Sizes: ¾", 1", 1¼", 1½", 2"



H-11178
Lock Wing
Recessed Ends
Inlet: Recessed Inside I.P. Thread
Outlet: Recessed Inside I.P. Thread
Finish Black
Sizes: ¾", 1", 1¼", 2"

New! H-11199
Re-lubricating Tool
Simple, handy tool for re-greasing all LubOseal Stops to restore original turning ease. Tool is screwed into grease port of stop and handle turned — that's all there is to it! Convenient H-853 Grease Sticks just fit tool to eliminate waste.

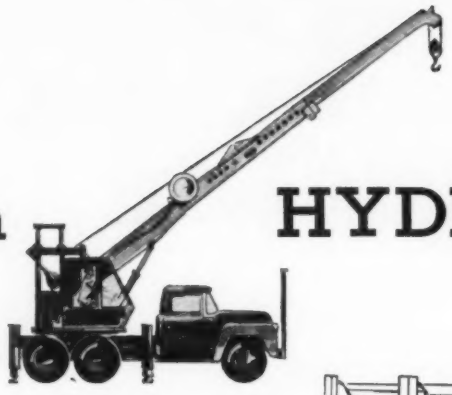
NO-BLO®

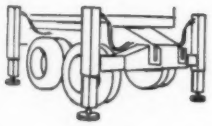
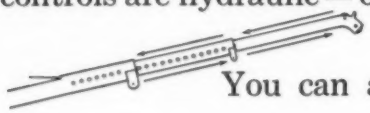
The features of these products are typical of the attention to detail in research, design and engineering that becomes a part of every Mueller No-Blo product manufactured for the gas industry. Write for complete information.

GEM

MUELLER CO. Since 1857 Serving the Gas Industry QUALITY

MUELLER CO.
DECATUR, ILL.

This is a  HYDROCRANE!

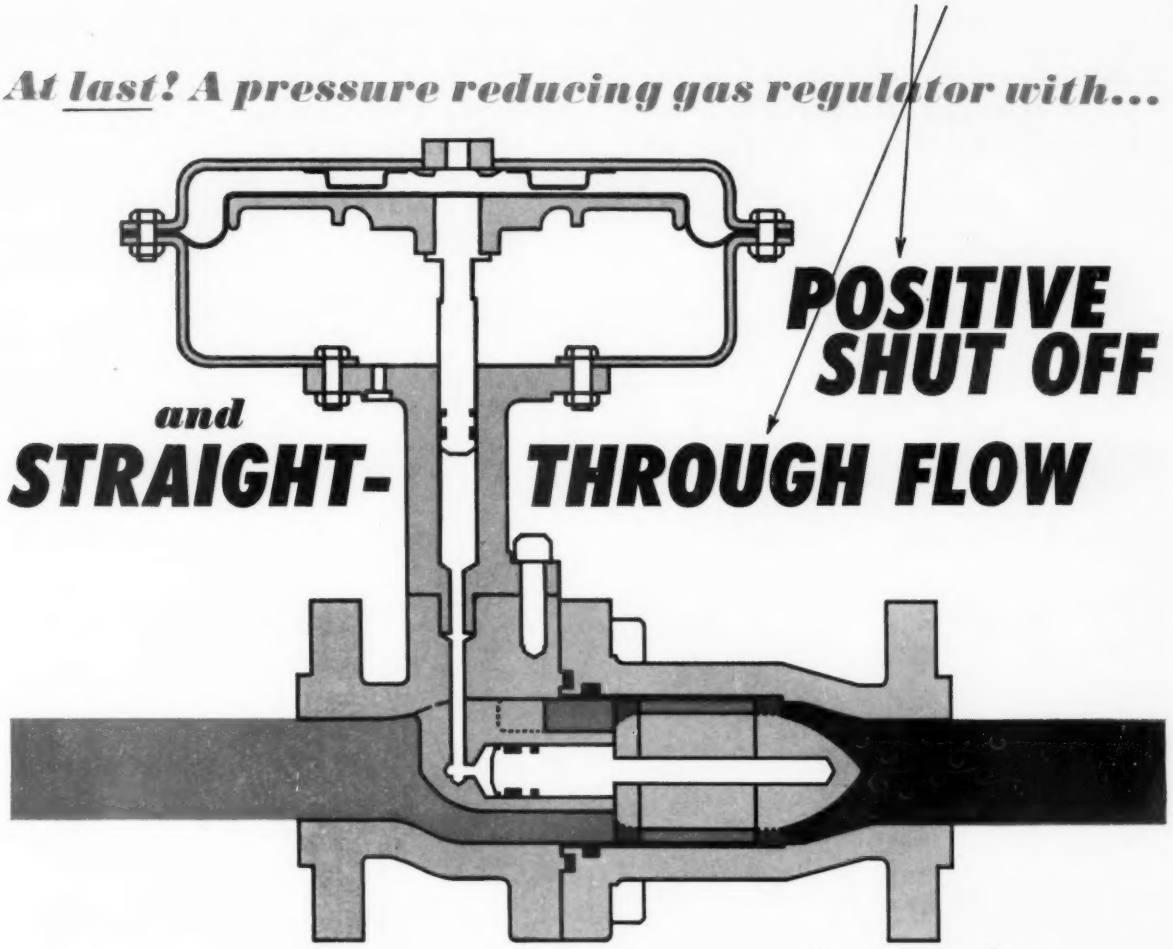
It will lift 24,000 pounds. Its outriggers  operate hydraulically and individually — within seconds to keep you level when you work. The controls are hydraulic — oil-smooth. The boom on a Hydrocrane is telescoping.  You can add 12 feet to your reach *on the move*, without stopping! The standard boom can be 24 to 36 feet long, the high lift boom can be 38 to 50 feet long — or even 70 feet long with the jib! The Hydrocrane travels over streets, highways, in plant yards as easily and fast as your pickup trucks. Does it work? It works so well that over 50% of the customers* who have ever bought a Hydrocrane, have bought another!

*Who are they? They're loggers, contractors, steel erectors. They're municipalities, utility companies and precast concrete people. And, there are many more every day. **See your Hydrocrane distributor for a free demonstration,** or write Dept. 36H, Bucyrus-Erie Company, South Milwaukee, Wisconsin.

BUCYRUS ERIE®

Builds Better Equipment

At last! A pressure reducing gas regulator with...



POSITIVE SHUT OFF

and

STRAIGHT-THROUGH FLOW

The NEW Jet Stream Regulator

Now you can stop high-speed gas turbulence, sound vibration, and leakage in your pressure regulators. The Jet Stream Regulator gives you straight-through laminar flow, positive shutoff, and no mechanical friction. Jet Stream's laminar flow stops the jetting of high speed gas and transient particles. This smooth straight-through flow also reduces sound vibration. Jet Stream's hydraulically actuated slave piston regulates flows with extremely fine control . . . from full flow to bubble-tight shutoff in three seconds. For efficiency and safety in your pressure reducing gas regulators . . . *use a Jet Stream Regulator!*

* *manufactured under the Welker Patent*

THE JET STREAM REGULATOR IS MADE IN THREE MODELS

• FLANGED • THREADED • INSERT

Write for the Jet Stream Catalog. A catalog giving complete specifications on the Jet Stream Regulator is available upon request.

APCO **DIVISION OF TEXTRON INC.**

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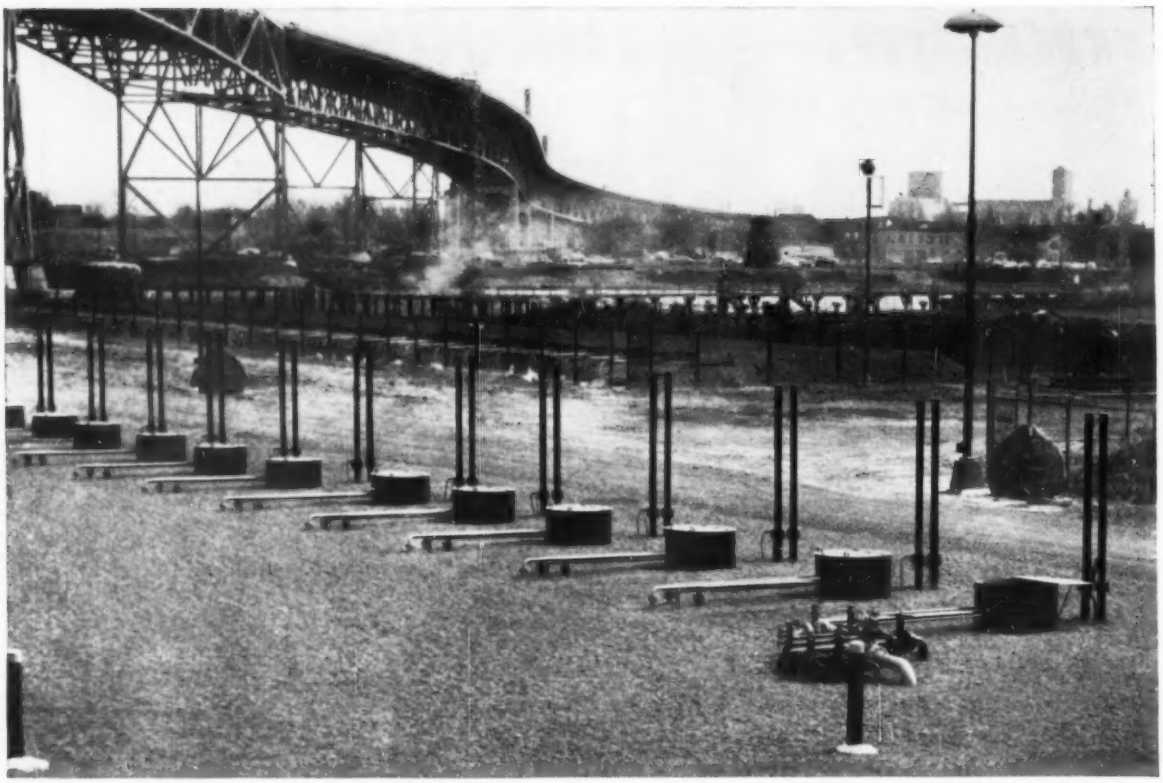
SHAVING PEAKS AT PEOPLES GAS
with Pritchard's LPG storage plants



Just a row of pipes. That's all you can see of the LPG peak shaving plant J. F. Pritchard & Co. has built for The Peoples Gas Light and Coke Company at its Calumet terminal. Yet, insignificant as it may appear, this plant and another Pritchard has installed at the company's Crawford terminal have added 2,400,000 gallons of underground capacity to the LPG storage systems operated by this Chicago utility.

Pritchard has built more than 80 peak shaving plants with a capacity of over 40,000,000 gallons of LPG for firms all over the country. Other Pritchard specialties for the gas industry: compressor stations, dehydration plants, gas conditioning and treating plants.

But Pritchard specializes in more than the mere construction of facilities. Pritchard has the experience and staff to render a complete service—from the planning stages to the final construction of a turnkey job. Economic surveys, preliminary engineering, and procurement are examples of the range of services Pritchard offers.

Regardless of the size of your next job—if it's in the gas industry—it will pay you to talk to Pritchard.

INDUSTRY'S PARTNER FOR PROGRESS

J. F. Pritchard & Co.

ENGINEERS • CONSTRUCTORS

Dept. 413, 4625 Roanoke Parkway, Kansas City 12, Mo.

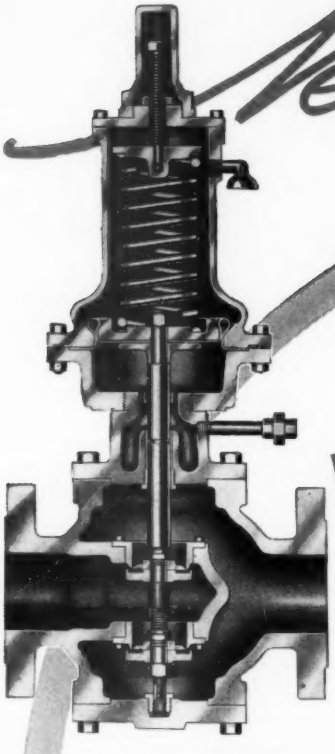
OFFICES IN CHICAGO, HOUSTON, PITTSBURGH, NEW YORK

SERVING THE GAS, POWER, PETROLEUM AND CHEMICAL INDUSTRIES

New in principle!

CHAPLIN-FULTON

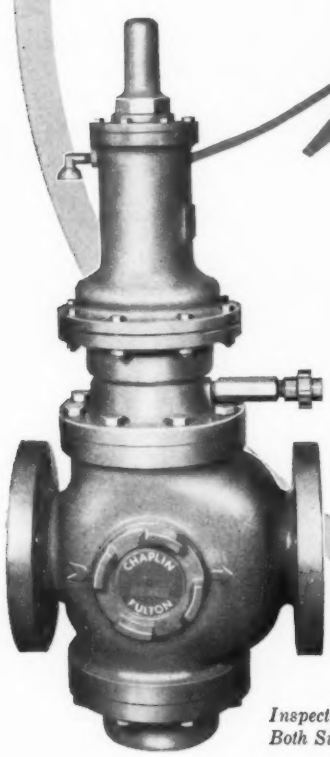
MODEL 441-57S GAS REGULATOR



SIZE: 2"—3"—4"—6"
125 lb. iron—W. P. 175 psi
250 lb. ductile—W. P. 400 psi
Series 30 steel—W. P. 720 psi

Model 57-S, a simple spring loaded regulator, operates on a new diaphragm principle which will control accurately until the regulator is wide open. The outlet pressure "fall-off," typical of spring regulators, is eliminated—not by an uncontrolled velocity effect—but by a diaphragm which changes its size as the valve moves to give straight line control. For pounds-to-pounds service,—controlled pressures to 75 psi with same assembly.

New in design!



Inspection Plates Both Sides.

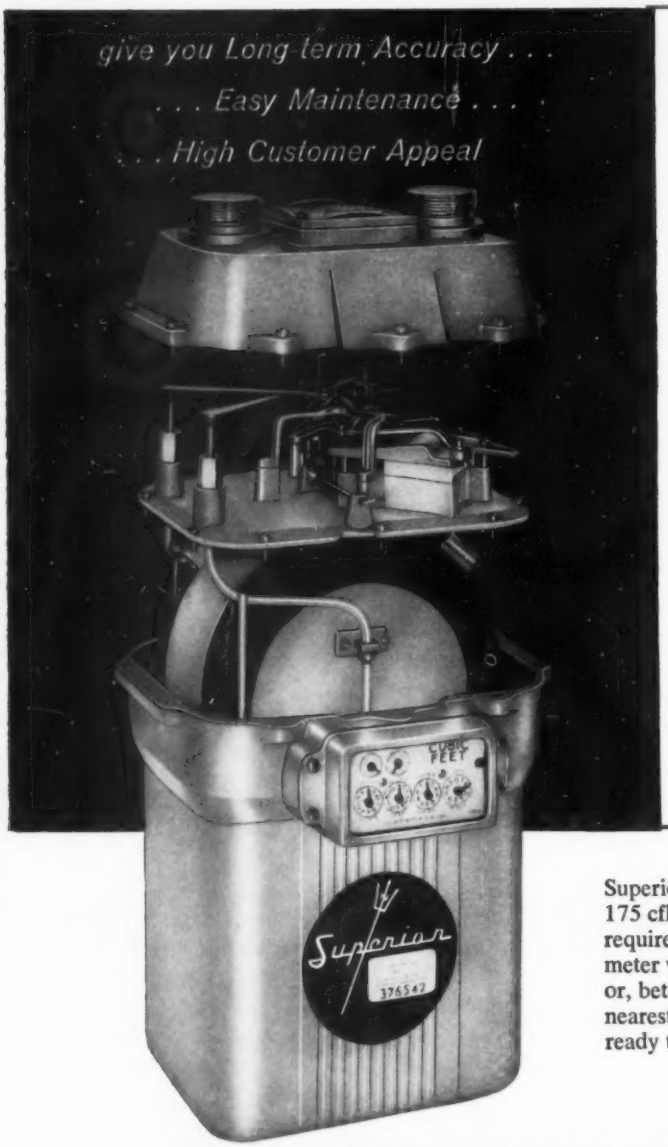
Also, a new body design—441—with gas exit areas greatly enlarged to prevent turbulence and increase capacity.
And to help in your visual inspection program—side inspection plates on *both* sides of the body have been included. Screwed-on with O-ring seal, they can be quickly removed and replaced—no gasket problem. Standard face-to-face dimensions now make the 441 interchangeable with other regulators.

ACCURATE CF MFG CO DEPENDABLE

Chaplin-Fulton
MANUFACTURING COMPANY
Pittsburgh 25, Pennsylvania

59-2

16 REASONS
SUPERIOR Aluminum Case METERS



1. **Slow movement...**
2. **Simple horizontal seam...easily sealed.**
3. **Accessible table...just remove the screws holding top.**
4. **Meter top removable without disturbing index box.**
5. **Valves readily accessible when top is removed.**
6. **Seam gasket stays resilient...**
7. **Entire mechanism lifts out with valve table.**
8. **Heavy-duty, sintered bronze bearings oil-impregnated for life.**
9. **Flag arrangement gives arm smooth operation and longer life.**
10. **Accurately-controlled diaphragm... no inaccuracies from deflection.**
11. **Cupped side flanges permit easy and safe carrying.**
12. **Calibration through convenient hand hole.**
13. **Broad base for conveyorized handling. Flats on top permit solid stacking.**
14. **Index removable without disturbing meter.**
15. **Modern appearance for quick customer acceptance.**
16. **Conforms to latest A.G.A. standardization specifications.**

Superior now manufactures aluminum case meters in 175 cfh, 250 cfh and 340 cfh sizes to meet most domestic requirements. To find out how this advanced-design meter will fit into your planning send for bulletin 1150... or, better still, phone the Superior representative nearest you. He understands your needs and stands ready to give you good, quick service.

SUPERIOR METER COMPANY, INC.

19 West 50th Street, New York 20, N. Y.

A SUBSIDIARY OF NEPTUNE METER COMPANY

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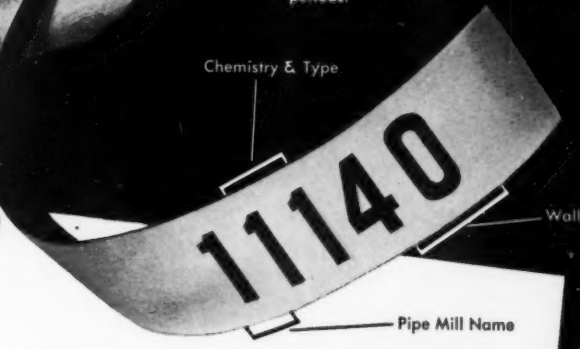
In Canada: Neptune Meters Ltd. • Toronto • Calgary • Halifax • Montreal • St. John • Vancouver • Winnipeg

15

announcing...

Data Tape, Hill-Hubbell's new development, provides simple, positive pipe identification even after prolonged storage periods.



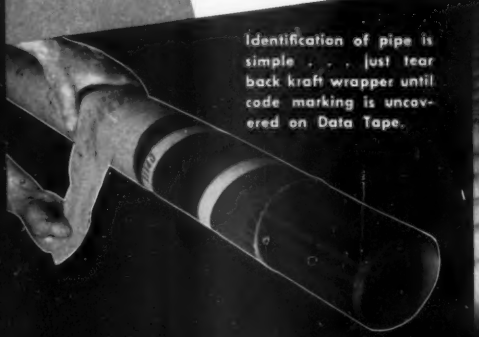
"data-tape"

another first in customer service by Hill-Hubbell

Hill-Hubbell's latest development, Data Tape, will provide more efficient inventory control through *positive pipe identification.*

The Tape is stamped at regular intervals with coded intelligence which identifies the pipe's manufacturer, wall thickness and chemistry. It is spiral-wrapped between the final coating or wrapping and the kraft paper. Hence, at a later date any cut length can be identified by merely tearing back the kraft wrapper far enough to uncover a code marking on the Tape. *Data Tape is available upon request at no extra cost.*

This new development is another assurance of Hill-Hubbell leadership in customer service and long run pipe protection. On your next job specify Hill-Hubbell — the name synonymous with quality in coated-and-wrapped pipe.



Identification of pipe is simple . . . just tear back kraft wrapper until code marking is uncovered on Data Tape.

Coating craftsman points to spiral-wrapped Data Tape which adheres to pipe even after kraft wrapper is removed.

Specify Hill-Hubbell wrapped pipe on your next job . . .

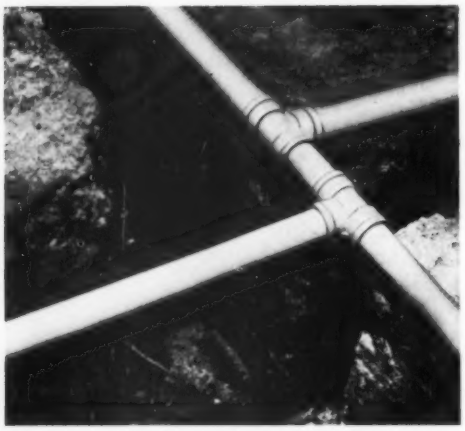
HILL·HUBBELL

DIVISION OF GENERAL PACIFIC CORP.

3091 MAYFIELD RD. • CLEVELAND 18, OHIO • YELLOWSTONE 2-7535

FACTORY APPLICATORS OF COATINGS AND WRAPPINGS

Found: THE ANSWER TO CORROSION, ELECTROLYSIS AND HIGH MAINTENANCE COSTS IN GAS LINES – *Kraloy high impact PVC Plastic Pipe provides permanent, trouble-free service at as little as 1/3 the cost!*



Narrow trenching and simple above-ground assembly of 2" mains are possible with lightweight KRALOY PVC Plastic Pipe. Fittings are "welded" on with brush and solvent.

KRALOY PVC Plastic service pipe can be led off existing plastic main by simple tapping procedure and solvent-welded plastic service tee. KRALOY is immune to rust, rot, electrolytic action.

Gas industry experts are turning in increasing numbers to *the* pipe that has proven to be most versatile and trouble-free in both main and service pipe installations—KRALOY PVC High Impact Plastic Pipe.

Impervious to galvanic or other ground corrosive actions, unaffected by electrolysis, rot or rust—KRALOY not only gets rid of sour and dirty gas headaches, but likewise most efficiently conquers other gas piping problems. KRALOY is cheaper to install. Light in weight, its flexibility and ease of making joints and bends simplifies transportation, handling and laying.

FIGHTS BOTH SOUR GAS AND COSTLY SOIL CORROSION

Quality protected by continuous laboratory control, today's KRALOY Pipe is precision extruded from basic compounds best suited to the job. With its inert, non-conductor anti-rust, rot and corrosion characteristics—and its smooth, mirror-finish interior walls that permit faster, freer output (up to 20%) through smaller pipe sizes—today's KRALOY gives you the right combination of permanent, trouble-free qualities to pipe the greatest volume of gas at the lowest cost.

KRALOY GIVES YOU THESE FEATURES

1. KRALOY is permanent—not subject to electrolysis, rot, rust or scale; needs no paint, coating, lining or cathodic protection; has the ability to withstand all ground corrosive actions.
2. KRALOY's high impact strength withstands abuse before and after installation.
3. KRALOY's lighter weight (1/8 that of steel) enables 1-man handling, lets your trucks carry more pipe footage.

"Gas Does It Better, Naturally"... *and even better* with KRALOY PVC Plastic Pipe! Available in all sizes from 1/4" to 12" with plastic fittings. Specify KRALOY for pipe *you can depend on* to do the job.

FREE—New 36-page Engineer's Handbook on PVC Plastic Pipe. Address Kraloy Plastic Pipe Co., Inc., Dept. GM-10, 4720 East Washington Blvd., Los Angeles 22, California.

K 59 21

NOTHING PIPES LIKE **KRALOY**

YOU SELL MORE BECAUSE... YOU HAVE MORE TO SELL

WITH THE JOHN WOOD FULL LINE

plus

GLASSLINER

IT'S NOT TALL —IT'S NOT SHORT

IT'S NOT FAT

IT'S NOT THIN

IT'S JUST RIGHT!

AMERICA'S MOST BEAUTIFUL COMPETITIVELY PRICED WATER HEATER

Look over them all. GLASSLINER stands out ahead in sales appeal. Exclusive new cast iron burner permits the low silhouette. Glasslined and galvanized in 20, 30 and 40 gallon models.

JOHN WOOD COMPANY

Heater and Tank Division

Conshohocken, Pennsylvania • Chicago, Illinois

QUALITY PRODUCTS JOHN WOOD SINCE 1865

Look what NORGE is doing with Gas Appliances!

NORGE GAS RANGE with Vertical Broiler

Broils meat on both sides at once in half the time! Seals in juices... reduces shrinkage! Turns off automatically when meat is done!

- **GRIDDLE** with thermostatic control — fries, grills. Converts to 5th burner.
- **BURNER-WITH-A-BRAIN** makes every pot and pan automatic!
- **MATCH-LESS!** Burners, broiler and oven all light automatically! No searching for matches!
- **AUTOMATIC ROTISSERIE** fits in oven. Spit turns automatically for even cooking! Self-basting. Easily removable!

36" Gold Star Award Range
Model GAX-680VB

Model DG-560 Dryer

NORGE HAMPER-DOR GAS DRYER

Exclusive 3-position door serves as clothes chute, sort 'n stack shelf, opens for basket loading!

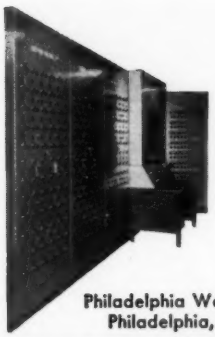
- **4-WAY DRYING** with or without heat; with or without tumbling for the safest, most wrinkle-free drying known!
- **WASH 'N WEAR CYCLE** removes wrinkles automatically!
- **AUTOMATIC SPRINKLER** dampens clothes right in the dryer.
- **WRITTEN GUARANTEE AGAINST RUST!**

WORLD'S FIRST **5-YEAR WARRANTY***

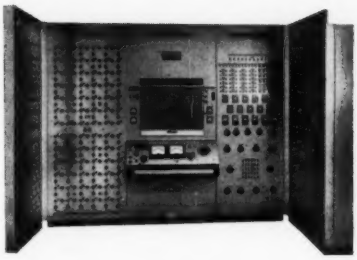
*Motor protected by full one-year warranty

NORGE® Easiest Sale on the Retail Floor!

NORGE SALES CORPORATION Subsidiary of Borg-Warner Corp., Merchandise Mart Plaza, Chicago 54, Ill. In Canada: Moffatts Ltd., Weston Ont. Export Sales: Borg-Warner International, Chicago 3, Ill.



Philadelphia Water Department
Philadelphia, Pennsylvania



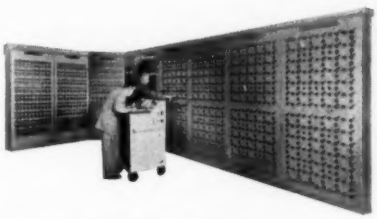
Baltimore County Department of Public Works
Towson, Maryland

McILROY
FLUID NETWORK
ANALYZER

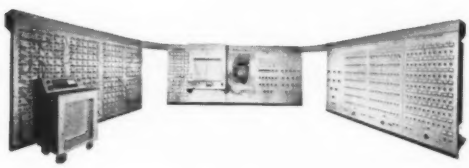
Used by leading utilities to provide up-to-the-minute system analysis and to prove, in advance, plans for expansion and growth.

STANDARD
TRADEMARK

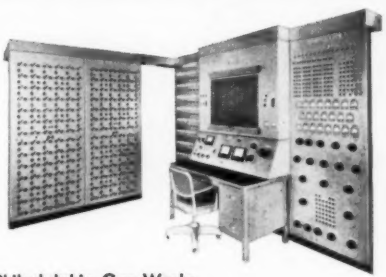
Washington Suburban Sanitary Commission
Hyattsville, Maryland



Public Service Electric and Gas Company
Newark, New Jersey



Southern California Gas Company
Los Angeles, California



Philadelphia Gas Works
Philadelphia, Pennsylvania

For information and a complete list of users of the McIlroy Fluid Network Analyzer, write to The Standard Electric Time Company, 89 Logan Street, Springfield 2, Massachusetts.

THE STANDARD ELECTRIC TIME COMPANY

Springfield, Massachusetts

If trouble-free service comes first with you...

...then cast iron pipe is first choice for your gas mains.

Cast iron pipe's record shows dozens of cases of more than 100 years' service—a claim unchallenged in the gas field. And improved, modern cast iron pipe assures you this same dependability for another 100 years.

Only Cast Iron Pipe gives you these outstanding features:

- √ Mechanical joints that stay tight through heavy top loads or washouts.
- √ Corrosion-resistant performance.
- √ Convenient lengths for easy installation, even in cramped quarters.
- √ Ruggedly constructed cast iron pipe resists a pressure of 9 tons per foot in 6-inch size, for instance.

...All good reasons for you to choose

CAST IRON PIPE

THE MARK OF THE 100-YEAR PIPE

Write for complete information to Cast Iron Pipe Research Association, Thos. F. Wolfe, Managing Director, 3440 Prudential Plaza, Chicago 1, Ill.

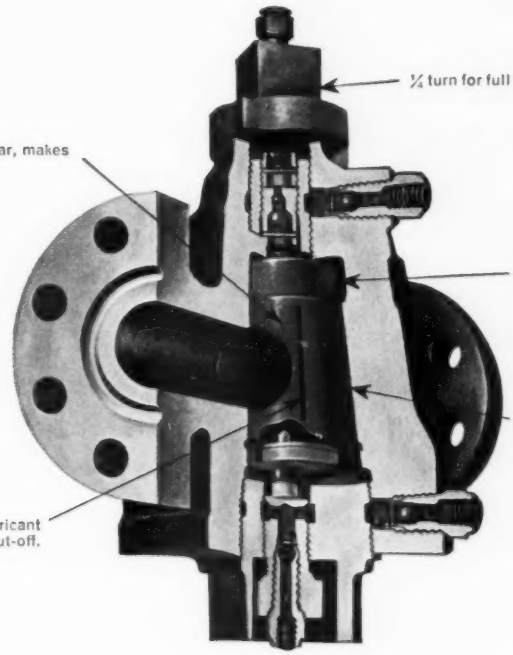
ROCKWELL- Nordstrom **VALVES**

Confidence

A parachute is worn with the hope that it will not be used, yet with the *confidence* that it will do the job if it's needed.

Some valves are like parachutes. On fire lines or emergency shut-offs, for example, they're the valves you never want to use. But they are the ones that must perform *perfectly* if the need arises. Most often you'll see Rockwell-Nordstrom lubricated plug valves in these "confidence" services because half a century of on-the-job proof has established one important fact: *they are valves you can depend on*. And it's this confidence on the tough services that has made them demanded so often on *every* service.

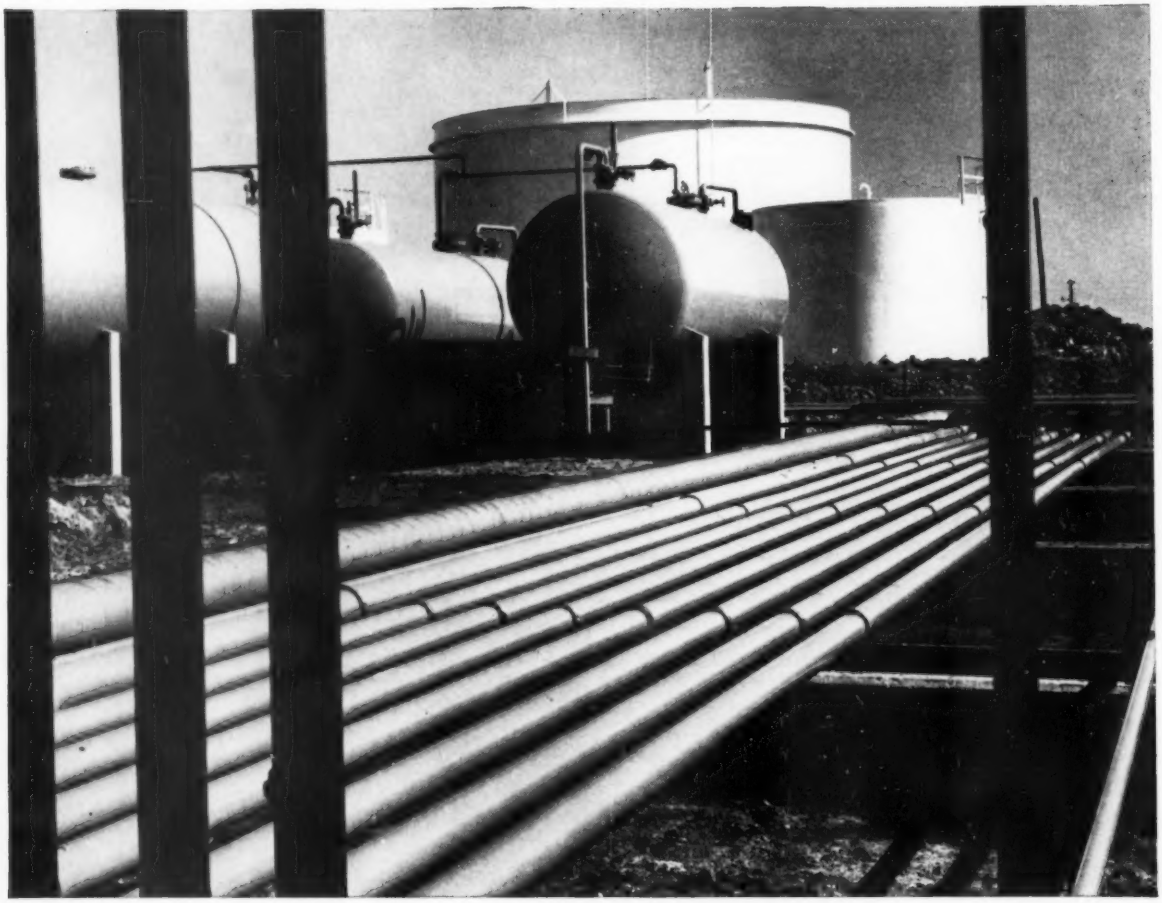
INSTANT, DEPENDABLE VALVE OPERATION


¼ turn for full opening or closure.
Lubricant stops wear, makes operation easy.
Even after months in one position, pressurized lubricant "cushions" plug for instant operation.
No exposed seats to wear and fail.
Sealdport® pressurized lubricant sealing assures *positive* shut-off.

Rockwell-Nordstrom is the original and world's most complete line of lubricated plug valves with sizes from ¾" to 36" and pressures to 15,000 lb. Available at leading oil field and industrial supply houses everywhere. For details, see your supplier or write: Rockwell Manufacturing Company, Pittsburgh 8, Pa. If you live outside the U. S. A., write: Rockwell International Division, Pittsburgh 8, Pa.

ROCKWELL-Nordstrom VALVES
another fine product by
ROCKWELL

®Reg. T.M. Rockwell Manufacturing Company



Solved! Gas distribution problems in networks of up to 1000 pipe sections and 400 loops by Hardy Cross method!

Royal Precision

LGP-30

World's largest-selling engineering and scientific computer

Maximum efficiency in distribution, transmission and storage is now a reality with the powerful LGP-30 electronic computer marketed by Royal McBee. Faster, more reliable *and more economical* results are being obtained in such typical problems as traverse closure, gas reservoir calculations for storage and production wells, high pressure gas transmission studies, mechanical design of pipelines and compressor stations. Answers are printed out in directly usable form—there's no deciphering required.

The LGP-30 is ideally suited to gas utility problems. Its unusually large (4096 word) memory provides the efficiency and flexibility of stored-program operation required to solve complicated problems involving large amounts of instructions and variable data. It is the easiest computer to program and operate. Your engineers solve their own problems at desk-side—without the need for computer specialists. User-engineers develop a man-machine relationship to the point where the LGP-30 becomes an extension of their own thinking capacity.

The LGP-30 is low in cost—about the price of a good engineer. No site preparation is necessary. Just plug it into the nearest wall outlet and it is ready to go to work. Customers have access to an extensive library of programs and sub-routines, as well as an active users organization.

Royal Precision Corporation

Royal Precision is jointly owned by the Royal McBee and General Precision Equipment Corporations. LGP-30 sales and service are available coast-to-coast, in Canada and abroad through Royal McBee Data Processing offices. For complete information on gas utility applications, write for brochures S-526 and S-420 to **ROYAL McBEE CORPORATION,** data processing division, Port Chester, N. Y.

By J. FRED EBDON, Editor and WILLIAM T. HARPER, Eastern Editor

HISTORY

MORE than four decades ago, in June 1918, the American Gas Association was born. Like the industry it serves, A.G.A. has a somewhat gnarled and venerable family tree.

Throughout recorded history trade or, more properly today, industrial associations have been formed to draw people in the same business together for mutual advancement. In 1873, the gas-house gangs, lamplighters, and other pioneers of our gas business first drew together by organization of the American Gas Light Association. This was a root for A.G.A.

There were other roots digging into hardpan earth of business association life. A Western Gas Association had turned up in 1877 and the Ohio Gas Light Association followed in 1901. These individual roots

MILESTONES OF PROGRESS

1918 June, the American Gas Association was organized through consolidation of the American Gas Institute and the National Commercial Gas Association, thus creating one gas association national in scope.

1919 The American Gas Association was incorporated.

1925 Testing Laboratories were established in Cleveland to become a national instrument of gas appliance and accessory testing and certification, a common agency of standardization, and a central research organization set up in one institution; dedicated to the American gas industry and to every customer it serves.

1927 The Natural Gas Association of America merged with the American Gas Association, uniting for the first time the two great branches of the gas industry.

1930 The A.G.A. Approval Requirements Committee becomes the Sectional Committee on Approval and Installation Requirements for Gas Burning Appliances, of the American Standards Association.

West Coast branch of the National Testing Laboratories was established in Los Angeles.

1935 First edition of the American Tentative Standard Code for Pressure Piping was approved and published. (Final approval and designation as an American Standard was given in 1942.)

National Advertising Committee was appointed to take immediate, effective and vigorous steps to develop a cooperative program of national advertising for all the gas industry.

1942 Post-war Planning Committee was appointed to consider post-war problems of the industry and to recommend desirable action to the Executive Board.

1944 The PAR Plan was begun as an outgrowth of the recommendations of the Post-war Planning Committee. Designed to review the industry's needs for Promotion, Advertising, and Research; to decide on the amount to be raised for such purposes by special subscription rates; to be responsible for raising a special PAR fund, to pass on all budgets for expenditures from the Fund and to administer the PAR Plan.

1945 The Hollywood Bureau was started to introduce gas appliances to TV viewers and the movie-going public through use in cinema and on TV programs.

1946 American Gas Association and American Petroleum Institute jointly issued volume 1 of Proved Reserves of Crude Oil, Natural Gas Liquids, and Natural Gas.

1951 The A.G.A. Washington Office was opened on a full-time basis to maintain liaison between industry and government, to bridge industry's interests and regulatory agencies' viewpoints in matters of rates, rules, regulations, taxes, safety and similar subjects.

1952 The Natural Gas Department and the Manufactured Gas Department were dissolved and by amendments to the constitution the Association became one unit.

1953 15-Point "Action Program" for gas industry development recommended by A.G.A. Board for adoption by operating company members.

1955 The present PAR Public Information Program was born, to help develop an informed and understanding public, supported by member company subscriptions under PAR.

The National Gas Industry Television Committee was initiated to increase Industry prestige with emphasis on modernity and to improve the competitive position of the Gas Industry particularly in the residential market.

1957 Effective January 1, automatic ignition of all burners required on all A.G.A. approved *commercial* gas cooking equipment.

The first National TV program sponsored by the American Gas Association was produced.

1958 A.G.A. "Parade of Gas Progress" Exhibit at Annual Convention sets pattern for future displays of new developments in gas technology, gas research and New Freedom Gas Kitchens and Laundries.

1959 Effective January 1, automatic ignition of all burners required on all A.G.A. approved *domestic* gas ranges.

Nation-wide Gold Star Range Program launched to capture a greater share of the quality range market for gas.

Blue Star All-Gas Home Program initiated to promote the use of gas appliances in new homes and to help builders in the sale of those homes.

joined forces in 1906 to form the American Gas Institute. Meanwhile, the National Commercial Gas Association had been organized in 1905.

Thus, the industry had two major trade associations working for it. The National Commercial Gas Association directed its eyes to matters of sales, advertising, and accounting. Technical and engineering branches of gas properties were served by the American Gas Light Association.

Soon, the objectives of both early associations became naturally entwined. Further, there was a need for expansion of service and voice to and of the industry. Inevitably, a force for merger was conceived and nurtured.

Thus, the American Gas Association developed in 1918. At that time the A.G.A. was a far cry from what it is today, but so was the gas industry.

Early organization of the Association included a Commercial Section, which functioned along the same lines as its predecessor, National Commercial Gas Association. A Technical Section filled the place of the former American Gas Institute and, in addition, branched out to become broader in scope and activities.

A Manufacturers Section of the new gas association represented the industry in the area generally comparable to the Society of British Gas Industries, with separate divisions for manufacturers of: accessories; apparatus and works; gas ranges; heating appliances; industrial appliances; lighting appliances; meters; etc.

A Publicity and Advertising Section was an added activity. An Accounting Section was also developed.

Work of 15 state or regional associations throughout the country, while local, was carried on in complete cooperation and harmony with work of the American Gas Association.

A.G.A.'s first Secretary Manager (Managing Director) was Mr. Oscar H. Fogg. He guided and developed the Association during the formative years 1919 through 1923. Subsequently, he was a distinguished vice-chairman of the board, Consolidated Edison Company of New York, Inc., and is now retired.

The second Managing Director was Mr. Alexander Forward, 1923-1945. He was known to the industry and A.G.A. staff as the "Major," from an outstanding military and military government record. Major Forward was a real gentleman who worked hard for his industry. He subsequently retired, and is now deceased, but not forgotten by senior members of the gas industry and the American Gas Association.

Mr. H. Carl Wolf, formerly President of the Atlanta Gas Light Co., was the next man to accept managing directorship at A.G.A. He was a relatively quiet man with a strong dedication to his duties. Mr. Wolf now deceased, retired in 1954.

Mr. C. S. Stackpole is the current Managing Director. I suspect that nearly everyone knows him. However, if you have missed personal contact with this effervescent, able leader, I'll introduce him to you later.

The first President of the Association was the late Mr. George B. Cortelyou. He served from 1918 through 1920. Mr. Cortelyou was president of Consolidated Edison Company of New York, Inc. and rendered distinguished service to the government of the United States on the Cabinet level.

Thereafter, Presidents were elected each year and have been recorded in the Annual Proceedings of the Association.

The early staff of A.G.A. totaled 12 persons by July 1919. Headquarters were maintained in Consolidated Edison's building, on the 13th (AU) floor at 4 Irving Place, New York City.

In 1922 offices were moved to the 18th floor of 342 Madison Ave., New York City. Finally, in 1927, headquarters were shifted to the present offices on the 5th floor, Graybar Building, 420 Lexington Ave., New York—right next door to Grand Central Station which the A.G.A. offices resemble on occasion.

A.G.A.'s first annual convention was held at the Statler hotel in New York, Oct. 13-17, 1919. There was an "estimated" attendance of 700. This compares with much more accurately counted attendances of from 3500 to 6000 today (the latter reached when an exhibit is included).

Our Association, like most others, has had its ups and downs, its failures and triumphs during its history. But progress of the gas industry and its prime association are the best measures of success.

Time and space permit only this capsulated history. We want to spend more time on the present and future, rather than the past. However, the more outstanding milestones as A.G.A. progressed along the road to its current stage of development are shown on the table.

TODAY

ERUDITE Francis Bacon (one who was no slouch at throwing words around) related man to the industry in which he works with this issuance:

"I hold every man a debtor to his profession; from which, as men of course do seek to receive countenance and profit, so ought they of duty to endeavor themselves, by way of amends, to be of help and ornament thereto."

The average American man is an excellent supporter of trade associations. Seemingly, regardless of his trade, profession, or industry, an association is something he cannot do without. It is true that some associations have folded for one reason or another. In some cases the industry tried to get along without a national association for awhile, but nearly invariably they got together and formed an association again. So, if you'll look into the matter, you will find, as I did, that businessmen in the United States, generally speaking, feel they have to have an industry association. It is not my purpose to answer the question why.[1]

Well, what is a trade or industry association? Herbert Hoover has said: "A trade association is an organization for mutual benefit which substitutes knowledge for ignorance, rumor, guess and suspicion. It tends to substitute research and reasoning for gambling and piracy, without closing the door to adventure or lessening the value of prophetic wisdom."

The American Gas Association is, in my estimation, people and know-how. It is not people on the Association's staff at 420 Lexington Ave. in New York City. Rather, it is people and know-how of members from the gas industry. The Association staff is a mechanism and catalyst through which the gas industry increases the usefulness and prosperity of itself by doing those things that can be done best or most economically by the entire industry working cooperatively at the national level. In short, A.G.A. is the national trade organization serving the gas industry.

Physically, A.G.A. is big. It is one of the largest trade associations in the world. It has well over 370 people on its staff; it has 166,350 sq ft of laboratories in Cleveland with a branch laboratory in Los Angeles; a Washington operation; regional managers in Detroit, New York, Dallas and Los Angeles. So, the staff is, like the Association's operations, spread out. And it takes around $10 million a year to keep it and a vast variety of projects running.

Membership in A.G.A. is held by some 377 operating gas companies out of the 1446 known to exist.[2] Association membership represents better than 93 per cent of the operating meters and 78 per cent of the total U. S. pipeline gas revenues. In addition, 592 manufacturers, 8 holding companies, 9 service companies, 47 associates and about 8000 individuals hold A.G.A. memberships.

The gas industry's central association differs from most associations in many ways. Most important differences originate from the character of the gas industry itself. First, our industry is regulated by local, state or federal agencies from the wellhead to the burnertip. Second, gas companies serve a limited market; usually, just an area such as a city, or operating utilities along a pipeline route. None, in any case, serve any and all comers across the length and breadth of the nation.

Then, too, most of A.G.A.'s utility company members are not direct competitors. This means that they can talk more freely, help the industry as a whole more, and exchange ideas or intelligence without very much (if any) fear of them being used in competition among each other.

With these few words of background, let's look at the objectives of our American Gas Association. They are well stated in the Association's Constitution and By-Laws:

(1) For the answer, see "Association Management," National Industrial Conference Board Library, New York City.
(2) Source, GAS Magazine's circulation lists and 1959 "plant" count.

1. To promote and develop the gas industry and to coordinate its activities;

2. To increase the effectiveness of gas service for the mutual benefit of the gas industry and the gas consuming public and to conserve and encourage investment in the gas industry;

3. To collect, coordinate and disseminate ideas and information on efficient methods of producing, gathering, manufacturing, transmitting, distributing, selling furnishing and utilizing gas and on the accounting and administrative methods employed in the gas industry;

4. To aid gas company members to produce, gather, manufacture, transmit, distribute, sell and furnish gas at the lowest cost commensurate with safe and adequate service, giving due regard to the interests of consumer, investor, and employee.

5. To advance knowledge and learning and to stimulate invention and research in the gas industry; to aid in the attainment of economic advancement, conservation and standardization, and to maintain and operate such laboratories or other facilities as may from time to time seem desirable;

6. To provide methods of education for its members, their employees and others interested in the gas industry; to encourage educational programs by others, and to maintain a clearing house of information and facilities for study in various fields of the gas industry;

7. To cooperate with other organizations interested in any field of the gas industry by interchange of information and facilities and by affiliating with any such organization in such manner and to such extent as may be deemed desirable.

ORGANIZATION

THERE is no single chief executive at A.G.A. Each of its member companies and individual members fills that post. There is a Managing Director, of course, but the executive decisions and policies of the Association stem from committees made up of gas industry personnel. The A.G.A.ers are very proud of, and positive about, this democratic relationship with members.

The actual governing body is the Association's Board of Directors. These are 35 elected members representing all phases of gas industry operations. Thirty members of the Board are elected during Executive Sessions of the annual convention. Two representatives from manufacturers and 13 from gas, holding or service company members are prescribed. From there on, it's any member's ball game, providing the General Nominating Committee has submitted his name or 50 company members have done likewise.

The five other Board members are the President, First Vice President, Second Vice President, Treasurer and the retiring President of the Association. They are submitted to vote by the General Nominating Committee at the General Session of each annual meeting. Again, 50 company or individual members can nominate additional candidates. When these five officers are elected, they automatically become members of the Board.

The Board of Directors has prime authority over any and all things pertaining to A.G.A. They are paramount in the fields of properties, funds, finances and activities of the Association. Take those factors away and there isn't a whole lot left.

The Board meets when and where it pleases. Both the President and not less than 12 members of the Board can call additional meetings. The current chairmen of organized sections, the Finance Committee (they shouldn't forget him!) the Laboratories Managing Committee, and the PAR Committee—as well as other committee chairmen when necessary—are invited to meetings of the Board. And once each year the Board of Directors must hold a special meeting with the Advisory Council.

An Executive Committee functions with most powers of the Board between Board meetings. Executive Committee members are appointed and removed by the Board of Directors, and the Committee must have not less than seven members.

The Board at its organization meeting each year sets up an Advisory Council. Not more than 40 members are permitted on the Council. Members of the Board can also serve on the Council. As mentioned, the Council meets with the Board at least once a year in an Executive Conference.

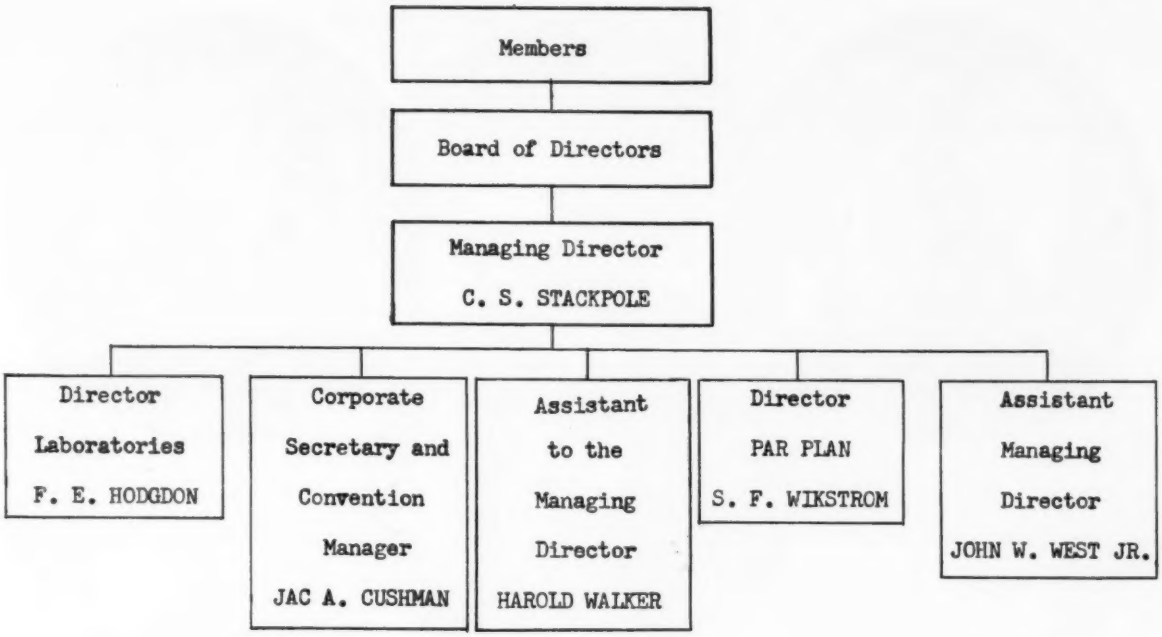
Officers of the Association are: (1) a president, (2) a first vice president, (3) a second vice president, (4) a managing director, (5) a secretary, and (6) a treasurer. In addition, assistant managing directors, assistant secretaries and assistant treasurers can be appointed by the Board.

The prexy, first and second veepees, and treasurer are elected as has been described. Other officers are appointed by the Board of Directors "to serve at its pleasure."

This is about as interesting reading as Robert's Rules of Order, but it should be given some thought to illustrate the democracy and control vested in the membership. In short, following this general picture, the gas industry "runs" the A.G.A.

Throughout the structure and operations of A.G.A. the key directing and controlling factor is the voluntary committee of interested members. The vast scope of activities of the Association is determined and its activities are guided by the committees. Naturally, committee decisions are implemented by Association staffers. But, staff members are directly responsible, through the Managing Director, to industry-member committees and the Board of Directors.

The setup resembles our government's system of checks and balances. Committees and staff members maintain this system in mutual understanding and cooperation. Thus, leadership from both directions is established, respected and directed. And full use of experience and ability is developed while the train is kept right on the track of betterment for the entire industry, rather than an individual, company or segment. At the now-popular "summit," however, the industry-member committee is the final decision-making body, subject to approval of the Board.



A.G.A. IN ACTION

• The Managing Director

WHEN you speak of A.G.A. and action in the same sentence, you automatically think of the energetic, astute managing director, Chet Stackpole. As managing director, he is chief administrative officer of the association. Some might bury themselves in the administrative side of things—but not Stackpole!

When he came to A.G.A. Chet found two major needs. There were others, but these seemed of prime importance to the gas industry: (1) Develop a national television advertising-public education program for the gas industry, and (2) produce better communications among members and the association so that the best of both would be emphasized.

The key to unlocking the door on the path to these objectives was, in his words, "Travel—get out of the office and meet and talk with the industry people." This he has done to the tune of some 100,000 miles a year.

As he sees the managing director's job, it is basically three responsibilities:

1. Get out and travel.
2. Get good people on the A.G.A. staff.
3. Make A.G.A people strong men by giving them something to do

Chet says he and the A.G.A. staff work for the gas industry. I think the secret of success that the gas industry has reaped was sparked, in part, by the fact that A.G.A. works WITH the gas industry. Much of the energy for this spark came from Chester Stackpole, though you'll never make him believe it.

Letters . . . he gets letters!! Here, a busy Stackpole blasts off an answering epistle to his secretary, the very efficient and personable Gloria Gaupp.

• **A portrait of Stackpole**

When you try to describe Chester S. (Chet) Stackpole, managing director of the A.G.A., it is a good idea to have a copy of Roget's "Thesaurus" handy. That might make it a little bit easier. For instance, you could look for him under LIVELINESS and you would find: Life, alacrity, vivacity, animation, and joviality. Any one or all of these words fit. One of the people in A.G.A.'s headquarters describes him thusly: "Whenever I think of Chet, I think of the bubbles in champagne." That fits, too.

Dynamic is another good synonym for him. Jim Beall, A.G.A.'s director of public information and a man who is prone to conservative statements, puts it this way: "Since Chet has taken over, everyone in the industry, from gas company presidents on down, has developed faith in the future of the industry due to Chet's enthusiasm, confidence and optimism."

Stackpole could be and has been likened to a "Billy Graham-type" of the gas industry. In the four years that he has been with A.G.A., he has traveled almost a half a million miles in carrying the "word" of past accomplishments by the industry and its future promises. He has spread this "gospel" to well over 100,000 people in 49 states, in nine countries and across a couple of oceans. He has "preached" his story to Cabinet members, Congressmen, governors, mayors, industry leaders, and women's clubs.

"People just don't realize yet what a tremendous job this industry of ours is doing," he reminds listeners. "They haven't any idea of all the commercial cooking being done with gas. They don't realize there's enough gas pipeline in this country to reach the moon and back again. These are the kind of things I try to tell them about; the little known things, but important things."

And everywhere Stackpole has gone, he has left a favorable impression of himself and the industry. Take, for instance, a trip earlier this year to Peebles, Scotland, and an address he delivered to the local gas industry people. The (London) *Gas Journal* reported it as "a brilliant and dazzling display of verbal pyrotechnics—not 'full of strange oaths' but crammed with anecdotal exuberances and eloquent pantomine. It wasn't just an address, it was a performance. His closing words were delivered with all the fervor of a revivalist meeting." The Scotsmen could have only been more impressed if Chet had been giving away money.

Even the Russians are impressed by gas' supersalesman. During this same trip, Chet was invited to speak on B.B.C. Radio Moscow monitored the broadcast and pounced on his comparison of our pipelines and the distance to the moon. He also added that "if there is gas on the moon, the people of the Free World will be the ones to get it."

"Sure enough," he recalls chuckling, "just a couple of weeks later, the Russians announced that their scientists had discovered gas on the moon."

The A.G.A. chief made another kind of impression during a speech he was making before 1200 people of the Houston Natural Gas Corp. last year. Anyone who has ever "seen" him speak is familiar with the way he flails his arms emphatically about. Chet was doing just that in Houston when he brought his fist

down with a crash on the rostrum. Some rostrum! Made of cardboard. Down went the rostrum in a heap. Up went gales of laughter from the audience. On went Chet Stackpole with his speech. Nothing can stop the man when he is talking about gas.

Stackpole is the kind of man who knows his industry, knows its problems and its people. He is not just a shallow front man, a pitch man, a glad-hander. He is a combination of a top flight management executive and a man with personality plus. He lives the industry day and night and probably dreams about it, too. Even his wardrobe reflects his interest—he wears a set of cuff links that are models of gas lamps.

Soon to be 60 years old—and if you guessed that was his age you qualify for a job on a carnival midway —the youthful-looking Stackpole is a non-conformist, a maverick, an advanced thinker. Many times his thoughts have shocked the industry. But, they have awakened it, also. He has even suggested that gas utilities give away free domestic gas air conditioners and thus build their summer load up to balance winter peaks rather than put the money into underground storage. He is trying to get the industry to find a way to distinguish between natural gas and gasoline, such as the British do with gas and petrol. Nonconformist? Since his arrival, sport coats are not taboo around A.G.A. headquarters.

And don't ever walk with Stackpole if you are in a hurry to get somewhere. It takes him 20 minutes to take what should only be a 10-minute walk because he is so busy being pleasant along the route. He stops to chat with everyone from the top brass to the elevator operators to the former secretaries and visiting mothers with their children. He also likes to share his pleasures. On a tour of Europe he sent letters back to the New York staff hoping they would enjoy some part of his sight-seeing adventures with him.

Strange adventures they sometimes have been, too. Like the time he had his pocket picked in Villa d'Este near Rome, Italy. He and E. H. (Ed) Smoker, president of United Gas Improvement, were part of a crowd of "rubber-necks" seeing the sights. They paid no attention to the bumping and shoving of the mob. A short while later, an Englishman approached them and handed Chet his wallet which, of course, was empty. To this day, he still gets a lot of ribbing about being the "big city man" who was taken over in a small Italian town.

Another time, he and his wife Barbara (Mrs. Stackpole accompanies him whenever possible) were riding in a gondola up the Grand Canal in Venice. Seeking some more of the storied atmosphere of such a trip, he tried to get the boatman to sing. The boatman either did not understand him or was just plain unromantic. So, Chet provided his own atmosphere as he broke into a loud and clear rendition of "O Sole Mio."

His tastes run from Brahms, to the art work of the masters in the Louvre in Paris, to Scotch-on-the-Rocks, golf as often as he can find time, and nonsmoking (he quit 22 years ago). When at home in his apartment in upper Manhattan, he likes to play his Hammond chord organ, but his favorite hobby (next to talking about his grandchildren) is reading. Check his briefcase any time he is on a trip and you will find such things as the *Harvard Business Review, Time, U. S. News & World Report, Public Utilities Fortnightly* and several (gas and electric) industry

magazines. He underlines parts of these magazines where he feels it will be of interest to his staff. He also reads the *New York Times*, the *New York Herald-Tribune* and the *Wall Street Journal*.

Before being graduated from Brown University (Ph B degree specializing in business management and economics, '22), he set the pattern of tireless activity upon which he operates today in which he estimates that he is "on the go" about 70 per cent of the time. He worked his way through college by rolling roofs, shingling roofs, steam cleaning clothes, waiting on tables, washing dishes and singing professionally.

After leaving college and its glee club, he was employed by Stone & Webster before spending 20 years with Consolidated Gas Electric Light & Power Co. of Baltimore (forerunner of Baltimore Gas and Electric Co.) From there, he became a vice president, Airtemp division of Chrysler Corp., and then on to V/P and manager of William division, Eureka William Corp. His next move was to his present post, a position for which he was selected after the A.G.A. spent almost a full year seeking the right successor to the late Carl Wolf.

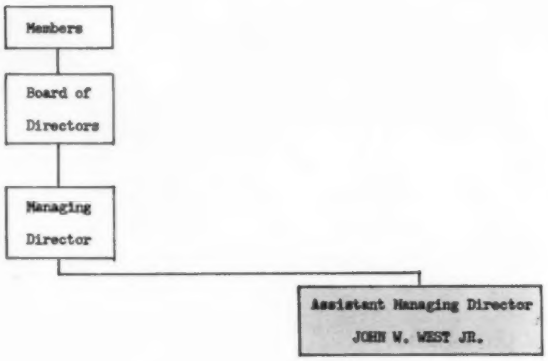
Although he is listed in *Who's Who of America* one of the organizations in which he is proudest of his membership in a group at Echo Lake in Canada. "It is called the Order of the Sag-Nam, fellows," Stackpole says with a wink as he talks with his New England accent that seems to end every sentence with an exclamation mark!

The staff at A.G.A. is even prouder of the order of their Gas-Man. He only asks of association personnel that they find ways to do things and never be stymied merely by the fear of making a mistake. He has told them, "I will forgive mistakes if you are doing, but I find it impossible to forgive if you are not doing. If you are doing something and you make a mistake, there are often corollary benefits which arise from an error. If you are doing nothing, you won't even obtain those benefits."

His management abilities, his willingness and readiness to delegate authority have made relationships pleasant around the office. "I told the folks when I came to A.G.A.," he recalls, "that I was going to be doing a lot of traveling. It seemed to me that the association just wasn't getting out to our members. I told the department heads that I was delegating to them the authority to do their job as best they knew how. All they had to do was to keep me informed. I told them I was giving them the ball and letting them run with it while I was out checking the industry at the grass roots level, seeking to find the members' wants, needs and criticisms."

With Chet Stackpole leading the way, the American Gas Association staff has been "running with the ball" ever since his arrival at the Graybar building on Lexington Ave. Even the competition is aware of this. At a public utilities meeting Stackpole was introduced by the chairman who was president of an electric company. The chairman's introduction went like this:

"Gentlemen, I now present Chet Stackpole who, first, we should have never let out of the electrical industry and, second, how do we get him back in?"



• Assistant Managing Director

JOHN W. WEST JR. still describes himself as a gas industry man rather than a professional trade association man, even after 33 years with A.G.A. and 17 years as assistant managing director.

Chet Stackpole describes John as A.G.A.'s "Indispensable Man." Chet declares "John's complete knowledge of the gas industry's many facets, his astute, analytical ability combined with his sincere and modest demeanor and a talent for 'putting words on paper,' are among the characteristics that members at all levels admire and use at every opportunity."

Chet further says: "John's presence at headquarters makes it possible for me to be away from the office so often—he 'keeps the store' in topnotch working condition when I'm gone."

An "underground storage" specialist long before the term became commonplace in the gas business, John worked his way through Virginia Polytechnic Institute as a casket upholsterer. Then, armed with a degree in engineering and physics, he joined Tidal Gas & Oil Co. in Oklahoma as manager of gas purchase and measurement. He later served as a power plant salesman, VPI instructor, and chief engineer for the State Corporation Commission, which regulates Virginia public utilities. He moved to A.G.A. in 1925 and, a year later, became secretary of what is now the Association's Residential Section.

An electronics fan for more than 40 years—during which time he has built at least a dozen radio and hi-fi outfits—John also skippers his own cabin cruiser, a Matthews of late-Twenties vintage which he has recently modernized.

Perhaps linked to his early experience in "underground storage" is his highly developed faculty for getting quickly to the bottom of a problem. A.G.A. staffers and industry members who approach him with problems get straightforward answers without delay. Possessed of a wealth of knowledge about the industry and the men who work in it, he places great importance on getting things decided quickly and accomplished quickly.

John West has that real "savvy" of the gas business. It extends his working knowledge from the rotary rock bit to the thermostically controlled top burner on a Gold Star range. Over the years, he has

soaked up an intimate understanding of problems and objectives of producers, pipeliners, and appliance and material manufacturers. It's pretty hard to stump him with a gas industry question.

Thus, his opinions are realistic about what's ahead and what it will take to get there in good shape.

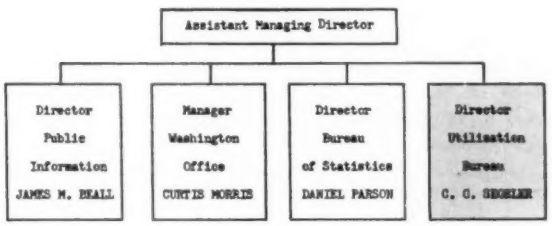
He lends his respected brainpower to more vital A.G.A. activities than can be enumerated. First of all, John West, as deputy managing director, directs all A.G.A. activities during the frequent absences of Chet Stackpole, as noted earlier. His normal and direct responsibilities include executive supervision of such General Fund activities as Public Information, the Bureau of Statistics, the Utilization Bureau, and the Washington Office.

A guiding light in the formation of PAR, he still provides a steering hand to this steadily expanding program for the industry.

Without running the gamut of his day-to-day agenda of jobs to be done, suffice it to say that John West is a major source of influence and inspiration throughout A.G.A. One reason for the confidence and respect which he has earned is what one staff member describes as the "open door" policy.

"John West is always available to anyone," the staffer relates. "His office door is always invitingly open."

A.G.A.'s "indispensable man," John W. West, Jr. (right), confers with Vaughan O'Brien, secretary of the General Management Section.



• Utilization bureau

TUCKED away in the A.G.A. New York offices is a Bureau that just simply vibrates with the spirit of energy mixed with more than ample jiggers of helpfulness. This is the Utilization Bureau that delves into the technical side of domestic, commercial and industrial uses of gas. Its purpose is stated very simply: Answer all the questions on utilization that gas companies, manufacturers, and the public at large can think up. The path to this objective is somewhat more complex.

All of the administrative personnel of this Bureau are engineers who work as engineers. This includes Technical Assistant Evelyn Kafka who can sling a slide rule along with the rest of them (see page 86). The Director is Curt G. Segeler, better known to all as George, and undoubtedly the source of much of the drive and enthusiasm this group exhibits.

Segeler is a "front line" staffer for A.G.A. He is on the phone several-to-many times a day answering requests for assistance or advise from just about every place that has been discovered by AT&T. He thinks gas utilization, talks the same subject, and I have little doubt but that his wife could go to work for a gas company right now unless George has the facility to leave it at the office (which I doubt). If you're looking for dedication to an industry, an association and to a job, just look up the Utilization staff and tell them you have a problem with a finned-tube, wangle-necked, forced-fired, steam generator in a water-wing factory. They'll come through.

The Utilization section's assistant director is Edgar A. Jahn, known throughout the industry as an expert on kitchen ventilation and for his on-the-spot advisory services for manufacturers using gas. The staff is rounded out with assistant utilization engineers W. Roger Sarno and Marvin D. Ringler; Mahlon A. Combs, consultant; technical assistant Evelyn Kafka; secretaries Eleanor Stahl and Shirley Levine.

One of the most interesting facets of Utilization's work is supplying correct facts to prevent or straighten out erroneous stories in the press about gas or gas service. This evolves into a regular service of protesting to, and educating, editors of popular media. Involved with these efforts is constant study of public accidents that might have been or are connected with gas. In addition to keeping the facts of accidents, etc., straight, the Utilization Bureau makes every effort to take some of the reporting load off the injured gas company in times of stress.

As Segeler explains it, "We certainly do not try to suppress anything after the facts of an incident are established. But, we do try to see that the gas industry and local utilities involved do not get credited

Research and Utilization get-together (left to right): T. L. Robey, director of Research; Edgar A. Jahn, assistant director, Utilization; Evelyn Kafka, technical assistant, Utilization; and C. G. Segeler, Utilization director.

with adverse and erroneous publicity." He is proud of his editor-educating program when it produces results such as a very unbiased, factual story in *Time* magazine after a major gas explosion in Canada. The Bureau co-ordinates and checks reports from an industry watch-dog group which is ever on the alert for harmful publicity. If a newspaper account gets it wrong or indicates a gas accident when some other fuel, service, or chemical was involved, the editor hears about it in a nice way and is supplied with available facts for correction.

The "Gas Appliance Service Manuals" originate in this department. These are basic tools in the gas industry. Over 17,000 of them have been sold, and 13,000 subscribers are receiving supplements as they are turned out. A new "Gas Heating Controls Service Manual" is just off the presses and is being snapped up by the hundreds. Supplements to it will be issued from time to time.

Another publication of the Utilization Bureau is a "Study of Gas Ranges and Clothes Dryers." There are only a hundred or so of this booklet left out of a 3000 copy print order.

The long-awaited "Gas Engineers' Handbook" is taking shape under the aegis of Utilization. This industry-developed volume has been in the mill for six or eight years, but is scheduled for publication in 1961. Much of the writing and editing, and practically all of the coordinating among a bushel of committees have been done in this Bureau. They are researching existing work, as well as carefully reviewing work produced chapter-by-chapter by member-composed committees.

There is much editorial work done in Utilization. All publications of A.G.A. (and, dear hearts, there are scads of them) are reviewed for technical accuracy in Utilization. They see that facts stated about gas are correct and that performances of gas appliances and other utilization equipment are factually stated. If a competitor's service and equipment is mentioned, the statements are also carefully examined to prevent distortion beyond the truth.

I am sure you can visualize the extent of cooperation and coordination that exists between the A.G.A. Labs and Utilization. They have to work hand in glove. Mrs. Kafka, for example, is Secretary of the Subcommittee on Gold Star Range Specifications. And she works on studies and surveys of Gold Star product acceptance and performance.

Ed Jahn is secretary of the Gold Star Water Heater Specifications subcommittee and George Segeler somehow finds time to serve as secretary of the Committee on Comparison of Competitive Services, Secretary of the L.P. Gas Utility Code Committee, and A.G.A. representative in the National Fire Protection Association.

Then, Utilization issues studies on electric vs. gas ranges, and other appliances. The testing phase of such work goes on continuously at the A.G.A. Labs. Findings are sent to Utilization where results of completely unbiased, feature-by-feature comparisons are analyzed. Utilization makes the decisions of what to publish.

In this same connection, every technical or trade magazine that has any gas industry significance is monitored in Segeler's section. Articles of pertinence are reproduced and added to Tech Files. Also, copies are distributed within the industry to those with problems that might be answered in the literature.

These Tech Files are extremely unique. They are undoubtedly the most complete collection of written technology on each piece of utilization equipment, utilization codes, industrial processes using gas, etc., in existence. Even translations from foreign technical literature go into Tech Files as George Segeler is multi-lingual.

Interesting studies now under way give us a couple of examples of some work by the Utilization squadron. The first of these deals with school heating.

The Iroquois Gas Co. found two schools near Buffalo, N. Y., that are absolutely identical, except that one is heated by gas, the other by electricity.

Iroquois placed a comparative study proposal be-

fore the CCS committee. While the study is a joint project of Iroquois and the CCS committee, the University of Buffalo demonstrated its interest by underwriting a portion of the cost.

The schools were built by the same contractor to identical blueprints and specifications. They are, naturally, the same size and have the same materials and workmanship. They even face to give exactly parallel exposures. Actually, they are miracles of similarity, a situation that cannot be equalled by any known two school buildings in the country. One is heated with electricity, the other with gas. Thus, the truth will out and cannot be realistically disputed.

Another project is in Albany, Ga. There, some 85 homes of fairly comparable construction have been equipped with electric powered heat pumps. Since the city operates the electric, gas and water services, costs for heat pumps vs. installed gas all-year air conditioners will be readily established in the same locality, along with performance in a very local climate.

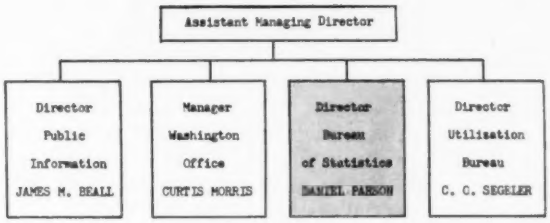
On projects like these, personnel from Utilization Bureau take to the field.

I shouldn't overlook the work done on codes within the Bureau. They help develop valid codes and requirements influencing the gas industry. Utilization also secures in a central point equipment and installation specifications developed in Washington for government agencies. Naturally, they work with Seward Abbott closely on this and are in Washington frequently working with the more-than-several government agencies.

Utilization also is involved with UNESCO and the International Gas Union through efforts to standardize gas industry language on a world-wide basis. For example, when you translate "grill" and "broiler" in and out of English, and several other languages, there are problems. George Segeler's ability to converse, write and read in several languages is, of course, invaluable in this work. He is a leader in the whole movement.

You will find Utilization Bureau members involved in a number of different subjects and projects. I don't think there is any other arm of A.G.A. that has so many different projects to study and variety of activities. You may see one of them in Washington trying to get boiler specifications written for coal firing changed to gas-fired; or detailing how a blind person can safely use a gas range (this actually happened); or putting Jack Paar and Jim Bachus straight—there is too a gas-fired television set; or working with FHA to tighten up relaxed minimum standards for water heaters in Florida so that electric units can crawl under the wire; or campaigning with Pittsburgh and Los Angeles where there are restrictions on gas-fired (and other) incinerators; or making critical studies and tests of lime kilns, heat reclaimers for gas burners, oil-fired water heaters, prestressed propane storage systems for utility use, rupture discs for over-pressure protection for gas mains, or heat treatment of aluminum and magnesium.

I have the impression the A.G.A. membership would be worth it for the work of the Utilization Bureau alone.



• Bureau of Statistics

A.G.A. has a fact-finding arm. This, basically, is the purpose of the Bureau of Statistics. It is a General Fund activity that has built a respected reputation for charting with accuracy the history, current condition and future of the industry, as well as analyzing and interpreting problems currently or prospectively facing the gas industry.

Statistics is the scene of studies in numbers, encompassing many diversified fields of important research. It is a 17 "man" department under the administration of Director Daniel Parson. He is ably assisted by Theodore I. Gradin, Assistant Director and Rate Analyst, and an analytically minded (and trained) staff.

The Bureau of Statistics operates under the auspices and direction of seven member-manned committees of the Association, with Dan Parson being Secretary of each of them. These committee titles—Gas Industry Finance and Economics, Financial Management, Economics, Gas Industry Statistics, Marketing Research, Rates, and Natural Gas Reserves—give a comprehensive idea of the scope of activities with which the Bureau is concerned. Its professional functions are sub-divided into five categories: rates, economic research, marketing research, financial analysis, and operating statistics. They chart the past and from these experiences, equated with economics of the era, extrapolate for the future. In their analytical work their concern is with basic problems of the industry and an attempt to determine ways in which industry profitability may be increased.

In their operating statistical programs they are constantly alert to ways in which the reporting burden on the companies composing the industry may be minimized and they are aware of the need to restrict questionnaires to studies which will be useful to member companies. These two functions are further recognized by the fact that all questionnaires proposed for mailing to the industry generally, by any A.G.A. staff member, must be approved by the Bureau for clarity, non-duplication with other forms, and similar matters before being submitted to the Managing Director for final approval.

Of great importance is the forecast work which the Bureau undertakes, to develop projections of basic industry operations annually for approximately a 10-year period. These projections cover customers, sales, revenues, miles of main, construction expenditures, and plant investment.

There are many detailed studies in important areas

which are made by this hard-working department, some on a repetitive basis and some only as circumstances require. The annual Gas Househeating Survey is one of these; this study is done for the benefit of heating manufacturers to permit them to establish more accurate manufacturing goals and sales quotas, but is also available to cooperating gas companies. Also in the marketing research area a biennial analysis of the potential market for each gas appliance is undertaken, with the current study covering 1958 through 1962; this study is intended to provide a basis for evaluating objectively sales performance by the industry.

Studies are issued at various intervals, reporting on load characteristics research studies undertaken by gas companies, on residential customers and the characteristics of gas service (including approximate appliance saturations) by county, and analyses of trends in annual and peak day heating degree days to foster more accurate heating consumption forecasts. In addition, there are, of course, the regular repetitive statistical studies such as the Quarterly Report of Gas Industry Operations, the Monthly Bulletin of Utility Gas Sales, the Annual Forecast of Construction Expenditures and reports on employee injuries in the gas industry and employee fatalities. The latter two are undertaken on behalf of the A.G.A. Accident Prevention Committee and are illustrative of the type of staff assistance made available by the Bureau to all other portions of the Association.

The best known and perhaps most used publication of the Bureau of Statistics is Gas Facts. Here, and in its pocket-sized condensed version, Gas Data Book, are shown summations of all detailed gas industry statistics for a given year (combined with data for previous years), which are relevant to the gas industry. Projections for the future are also published. In short, if you need a single figure or a table of figures on nearly any subject of interest within the gas industry, Gas Facts is the place where you are most apt to find it. This is the only reference volume which brings together the past, present, and future of the gas industry in statistical form within one cover.

Daniel Parson (left), director of Bureau of Statistics; Ted Gradin (center), assistant director, Statistics; and Rauel N. Papich (right), safety consultant, discuss a safety study.

With regard to rate functions, the Bureau is responsible for the publication of the A.G.A. Rate Service which lists the rates for all types of gas service by virtually every gas company within the United States and Canada. These are assembled in a single volume which is kept up to date by periodic supplements. Such a service is obviously invaluable to rate engineers throughout the country as well as to industrial organizations, financial analysts and numerous other interested groups.

Other rate functions of the Bureau are the encouragement of gas companies (and cooperation with such companies) to make research studies into load characteristics of their customers. (In many instances, the Bureau actively summarizes, analyzes and interprets the results of these studies for general industry dissemination.) It is also contemplated that the Bureau will shortly initiate quarterly releases digesting and summarizing important court and regulatory decisions on rate matters. Also in the process of completion currently is an analysis of the extent to which main extension policies have been based on un-realistic estimates of customer and revenue growth; conservatism in such estimates may result in refusal to construct (without customer contributions) some main extensions which might, in the near future, have proven profitable.

The Bureau works closely with many governmental agencies in providing them with information and thus eliminating the possibility that such agencies would otherwise institute questionnaires of their own, directed to gas companies. Some of these agencies include the U. S. Bureau of Labor Statistics, the Federal Reserve System, the Bureau of Mines, and the Census Bureau.

The Bureau of Statistics is also deeply involved with the financial community; these organizations need statistics of all sorts regarding the gas industry. Dan Parson, who is a member of the New York Society of Security Analysts as well as numerous other professional organizations, represents A.G.A.'s contact with the financial community. A major portion of the Bureau's substantial number of requests, estimated at approximately 4000 per year, originate within investment banking houses, brokerage firms, insurance companies, and other financial institutions. The Bureau is constantly aware of the need to develop information useful in improving the regard of the financial community for the gas industry, both in the areas of financial problems and regulatory action. They make statistical analyses to produce forecasts of the financing needs of the industry for years to come, to provide some indication of the magnitude of future industry growth and money requirements.

One very dynamic operation of the Bureau is the arrangement and organization of gas industry Financial Forums. Usually held approximately every two years, these meetings represent opportunities for im-

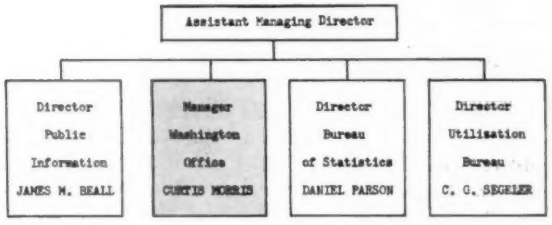
portant analysts from all branches of the financial community to sit down and talk about mutual problems with key top level gas industry executives. Off-the-record speeches are presented with adequate time for informal question and answer periods, and are well-received by both participating industries.

The Bureau maintains a 5000-person list of members of the financial community interested in the gas industry which is used to make pertinent mailings as needed. This list is also available to member companies for their own individual use upon request.

A.G.A.'s statistical efforts started in the late 1920's with some relatively rudimentary fact gathering and summarization. From that start it has been a steady progression toward its present important status and expanded activities. The basic differences between "then" and "now" is that originally, where the work was done on a modest scale and limited only to basic statistics, it is now undertaken with much greater depth of study and variety of subjects handled.

Dan Parson would like to see more work done in the area of marketing research. He would like to extend further, research into consumer characteristics and purchasing habits. Some preliminary work has been done in this area but to date it has been limited by budgetary considerations. He feels that this type of research would be particularly valuable to gas companies in their promotion and merchandising activities to combat more effectively the substantially greater funds available to competitive energy industries, as it is far too costly to make avoidable mistakes these days.

Gas company members have been doing an increasing amount of marketing research work in recent years, partially fostered by the leadership of the Bureau of Statistics in this area. This increased interest is one way in which gas companies are reducing the need for subjective opinions by the use of factual analyses, and is most gratifying to the industry's top analyst. The Bureau of Statistics is not equipped with electronic equipment. The variety and nature of their calculations, as opposed to mass data processing on the same routine, probably rules out E.D.P. But they do have good equipment and have found their current techniques adequate for all purposes.



Washington Manager
Curtis Morris

• The Washington Operation

As a further service to its company members and others, the A.G.A. maintains a Washington office to learn and interpret what the Federal government and its multiple agencies are doing that will affect the gas industry. At the same time, it maintains liaison with agencies and branches of the government so they will know the gas industry's problems and accomplishments.

One of the most important functions of A.G.A.'s Washington operation is contact with federal agencies that are potential customers of the gas industry or control the purchase of utilization equipment for the government.

A staff of four carries on this work. The Manager is a man who reminds one of all the famous men of the bar and judges composited into one. The fact is, however, that Curtis Morris, Washington Office Manager, isn't a lawyer. He has spent all of his life, though, in tax and legislative work in the oil and gas industries.

One of the major functions of this distinguished Capital-coverer is the "A.G.A. Information Service" he issues to the gas industry. In it, recent FPC decisions and hearings are briefed with a candor that is appreciated by most of his readers. Other important Washington action is also boiled down, and slickly presented. To do this, Curtis Morris is strictly on the Washington beat. He makes the rounds chatting with the large and small alike; checking out press calls; and interviewing. His specialty is Congressional and Regulatory developments. He is ably assisted in all this work by an assistant, Franklin B. Wise.

Morris is a registered lobbyist for the gas industry. But, as Curtis says with a laugh, "I really do very little lobbying, and what little I do is on a very responsible, out-in-the-open basis." He is quick to point out that he was in Washington for A.G.A. before he registered to lobby and that his basic job is still covering the nation's capital much as a news columnist would. He spends by far the majority of his time on this and just plain "meeting and contacting people like gas (and oil) company lawyers situated in or visiting Washington." His principal

port of call is, of course, the Federal Power Commission. He is well known there and counts the commissioners, examiners, lawyers, engineers, etc., among his close business friends.

An A.G.A. Utilization Engineer is a very vital addition to the Washington hassle-go-'round. Sales-minded Seward Abbott holds down this chair. But, you don't find him sitting around much. He covers agencies like the Army, Navy, Air Force, Corps of Engineers, General Service Administration, Federal Housing Administration, Veterans Administration, Bureau of Standards, etc.

He keeps his ears open for new building or new specifications of government units. His job—if the government is going to build something, tell the gas companies in the area about it and then work like the dickens with the agency involved to see that the project goes all-gas. It takes constant contact with all the listed agencies, plus more, to keep them informed on what gas can do and why it is usually better when done with gas.

Take for example the Zinder Report. The Armed Forces were presented with this study at a gas industry luncheon for which the Department of Defense suggested the attendance list. After that, the Washington Office spread it all through the government by personal delivery and discussion.

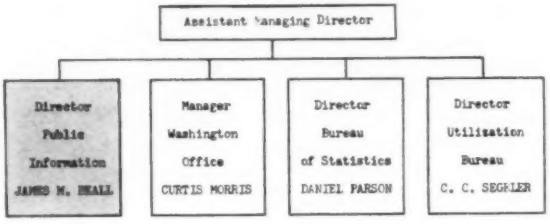
Typical of projects that Abbott handles are the effort to establish standards on absorption air conditioning and broadening of FHA Title 1 to include built-in gas appliances. He figures the gas companies can't get government business if they know about it too late (the Little Rock Capehart housing heat pump experience is a case in point), so he builds lists of Capehart housing projects current with the Air Force, Navy and FHA so that A.G.A. members know where business potential exists. Usually, however, it is a little late at this point to get appliances in as by this stage they have already been selected in a number of cases. But he keeps his ear to the ground so that the member companies will have the word when such projects are proposed.

Once you know of a proposed housing project, you have to know who to see to get gas accepted as the proper fuel and to place gas appliances. So, Abbott has furnished member-company delegates with lists of Air Force, Navy, GSA, etc., personnel so that regional contacts can be established. The Utilization Engineer in Washington can do just so much toward the gas effort. As Abbott says: "One point should be made crystal clear. Government agencies in Washington are set up to develop criteria, guidance and review, but initiation and recommendations come from government personnel in the field. This is as it should be. We have a job to do here in Washington, but there is much more that must be done at the local level."

Curtis Morris, Seward Abbott and Frank Wise help visitors from the gas industry to see what and who they should while in Washington. And they assist in a gas industry luncheon once a month for the interested press (GAS' Washington Bureau expert Neil Regeimbal is an example) and others in the Capital who work in or follow the gas industry. In this way A.G.A. and people in Washington interested in gas industry matters touch bases with each other.

Once a year, a very informal and enjoyable dinner meeting is given for all the people in Washington the A.G.A.'s Washington Office contacts with some regularity. These have been well received and have become a tradition that everyone looks forward to.

So, that is the Washington operation—another of the many services provided by the American Gas Association. It does a good job of keeping the industry informed from the seat of our Federal government, and helping members and associated organizations solve problems that turn up when working with federal agencies.



• Public Relations

IN addition to the PAR Public Information program, A.G.A.'s Public Information Bureau seeks and delivers gas industry publicity so badly needed to keep the image of a great and growing industry before the public. Why worry about the public in a regulated industry? Because, of course, the public is not captive. It is that mass of people who are customers, potential customers, and investors. Publicity also enhances the stature of the gas industry in the financial community and among governments.

Head of Public Information (including the PAR-program part) is James M. Beall. Jim is an energetic organizer, deep thinker and an avid tennis player. He is bringing his children along in the same tennis-playing tradition. But he does not devote all of his time to this recreation.

Jim's small exterior packs a lot of toughness. Inside he has tact to spare in spite of very firm convictions about the basic advantages of investor-owned business, the disadvantages of welfare states, the growing serious danger of continued inflation. He has been leading the fight against public apathy about the increasing number of municipal gas systems for years.

It is not an easy task to keep the image of an industry before the public. When you have an industry like the gas industry, it is doubly tough because: (1) the three segments do not always see eye to eye; (2) not all gas companies are public relations conscious enough to even bother to have a public relations director and program; and (3) some gas companies, while aware that public relations does pay off, are inclined to take a strictly local approach.

Thus, Jim Beall is busily at work helping the gas

Public Information Bureau meeting (from left): Bernard Kaapcke, special feature editor; Phyllis Kilkenny, home feature editor; James M. Beall, director; Lorne S. Waddell, manager, press relations; and Henry E. Littlehales, assistant director.

industry's public relations teams help themselves. He and his staff are frequently consulted about organization of public relations programs; what a proper budget would be for a specific campaign; conduct of a projected project; and Jim is often working behind the scenes to encourage certain gas companies to either do more, or develop from scratch, in the way of valid public relations work.

The Public Information and Publications Bureau staff is a carefully selected group highly specialized in the communications of thought through the written and spoken word, and through the graphic and pictorial arts.

Henry E. (Hank) Littlehales is Assistant Director of the Bureau. He also changes over to his PAR Public Information hat on occasion to conduct successful Public Relations Workshops in various parts of the country.

Others on the staff include:

Lorne S. Waddell—Manager Press Relations.
Richard P. Mulligan—Publications Supervisor.
Bernard Kaapcke—Special Feature Editor.
Arthur Q. Smith—Industrial Feature Editor.
Phyllis Kilkenny—Home Feature Editor.
Walter Dyer—Editor, A.G.A. Monthly.

Naturally, there are major publications for the gas industry. These are designed to keep A.G.A. members well informed about the industry. Such publications include the A.G.A. Monthly; the AGA-PAR annual report; and, of course, the official Proceedings of the A.G.A. Annual Convention and the Operating Conferences. Many other publications, displays, presentations and incidental art projects are developed in the bureau.

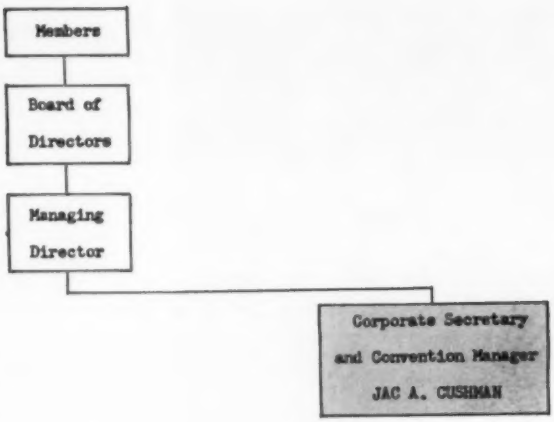
The special target for A.G.A. publicity is the many thousands of newspapers and magazines, both general and specialized readership types, that blanket the country. The Public Information and Publications Department releases news to these media at the slightest valid provocation. In 1958, for example, 82 major news releases were flashed across city desks and over the wire services to the popular press, radio, TV, etc. Many received nationwide "play."

Servicing the nation's news and special interest media requires availability of a variety of stories, releases, pictures, charts and graphs, etc. This department can turn out a well received article on new features for gas ranges how gas is used in the manufacture of TV tubes; the program for an approaching convention; the financial condition and possibilities of gas companies and the industry, etc.

PR at A.G.A. has the flexibility to initiate a flow of information as well as serve the requests for material in many forms from newspapers, consumer magazines, wire services, radio and TV, financial houses and publications, trade journals in general, gas trade journals in particular, and for any and all comers wanting something from or on the "gas story."

Not all of this work is done from behind desks at 420 Lexington Ave., N. Y. C. The PR boys get out and see for themselves. For example, a field trip might be taken by a staff member to develop a pool of articles on a particular subject much in demand. Then, one or more of the PR staff is usually at A.G.A.-sponsored conventions to feed on-the-scene news coverage to newspapers and other media.

All in all, A.G.A.'s is an efficient news bureau set up to fill the full needs of any and all agencies delving into the science of communication and knowledge. Back this up with a staff that is available for consultation and is always trying to encourage gas companies to make further effort in this important field, and you have a department that is doing a job for the prestige of the industry from grass-roots to Wall Street.



• Secretary and Convention Manager

JAC ALLERTON CUSHMAN holds down this important, twin-challenge post. It is a big job—one that is never finished. That's why Jac likes it. He is not the type to relax after a project is completed and admire himself. Even if he were that type, he couldn't stop because there is always another job to do.

One of Jac's ancestors climbed on the Mayflower some years back. Perhaps that is where this youngish-looking association officer gets his pioneering spirit. And this may be the fountainhead for his follow-through ability, for which he is well known in the Halls of A.G.A. and throughout the gas industry.

Cushman is characteristic of modern association executives. He wears his hair crew-cut; tends toward exuberantly hued sports jackets; is an attentive listener (and you can visualize wheels turning while he does so); and greets you with a smile, carrying with it a sincerity and dedication.

A.G.A.'s Constitution and By-Laws has this to say about the duties of its Secretary: "The Secretary shall have custody of the seal of this Association and shall affix it to all documents as authorized by the Board of Directors." This would lead one to think that Jac Cushman sits around slapping his seal on impressive papers all day. Nothing could be further from the truth.

Some 30 per cent of his time is spent on the Executive Conference, for one thing. This conference is held once a year. Top policy-making executives of member companies are invited. They sit down with A.G.A.'s Board of Directors and the Advisory Council to discuss pending and future problems and progress. (At the last one, at the Broadmoor in Colorado Springs, Convention Manager Cushman decided to take up golf, which he did with divot-flying, snake-whacking success.)

The Secretary has charge of memberships and committee-member clearances. Both are time consuming jobs that require just the right tact and tenacity. With a membership of about 8000 individuals, plus hundreds in other classifications, this chore requires meticulous attention to detail. Jac is particularly proud of the changes made in company membership invoices that make billings easier to understand.

The factors involved with committee membership make selection a complex problem. The idea is to constantly get new blood on the committees. But, you can't use personnel from any one gas company too much or too often. Thus, like most of its dealings with the industry, A.G.A.'s actions are approved by the members. Hence, each gas company member has a clearance officer. The Secretary's office submits a list of all men in a specific gas company selected for committee activity on any of the hundreds of committees. The company clearance officer then determines if the individuals have the time, temper and attitude to engage in this industry-benefiting work. Only after this member company approval does a man's name find itself into the big committee book maintained by the Secretary.

Cushman serves as Secretary of the General Nominating Committee; has the responsibility of association records retention (a very big problem); supervises the operation of the A.G.A.'s big modern library; and, of course, is Secretary of the Board of Directors, handling agenda, background and minutes.

Convention planning and management is another very challenging task for the Secretary. It has to be done in advance—well in advance. Just "hiring the hall" is complex enough as hotels large enough for the annual meeting, for example, are booking into the mid-60's right now. But in addition, there are other steps.

First, the new Convention Committee has to be queried for their ideas and to work out an agenda. From there, budgets, topics, speakers, signs, sub-

Convention planning group (from left): S. C. Wentworth, administrator, dues & services; R. J. Fitzgerald, auditor; Jac Cushman, secretary & convention manager; R. F. Mulligan, publications supervisor & secretary, convention entertainment committee; R. J. Cutting, controller & office manager; Gladys Hanshaw, secretary, reservations & arrangements; Carmine Veltri, assistant office manager & assistant convention manager.

committees, notices, etc., all have to be arranged and coordinated. There are a million things that have to be attended to. And, all have to be done according to a time schedule and coordinated with each other.

It is enough of a job just getting thousands of people (all of whom are "important" to an association) to make reservations, and later registered and bedded down in as close to the room of their choice as possible.

Fees have to be collected, accounted for and audited; entertainment has to be provided; speakers always have odd sized and shaped slides they wish to project; somebody has to keep track of where everybody is, within reason; and somebody always needs a different type of chair, a sign, two tubs for icing beer, a larger or smaller meeting room (seldom the same size as the one reserved for them); sundry stage props, their picture taken with Julia Meade, or two tickets to the bull fights. After two or three days of this, the Convention Manager and his Convention Planning Group need strait jackets, but they are association men, so they brace their aching backs, lace their shoes up tighter, rumble through several pockets full of crumpled "things-to-do" notes, freeze on that old smile, and flail away at it like they were having a vacation.

Naturally, Jac Cushman does not do all of this himself. The responsibility, however, is his. He is extremely fortunate to have an experienced group of real "pros" for the Convention Planning Group. The group lines up like this:

Strafford C. Wentworth
Administrator—Dues & Services

Raymond J. Fitzgerald
Auditor

Richard F. Mulligan
Publications Supervisor & Secretary of Convention Entertainment Committee

Robert J. Cutting
Controller & Office Manager

Gladys Hanshaw
Secretary of Reservations and Arrangements

Carmine Veltri
Assistant Office Manager & Assistant Convention Manager

(Jac A. Cushman)
Secretary and Convention Manager

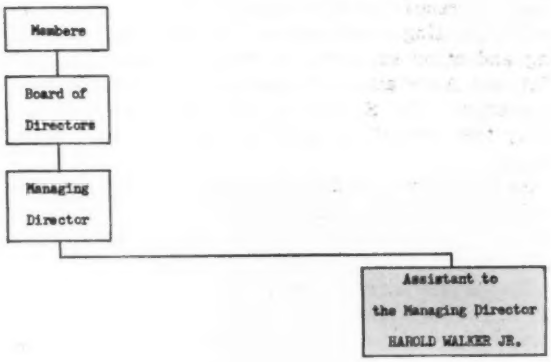
These are the Ringling Brothers of the convention circuit. They put 'em together, efficiently run 'em from the background, and tear 'em down again to move on to the next one. They are used to complaints, some justified and more not. May I suggest that you look up one or all of this group during this October's annual convention or drop them a line afterward, giving them a deserved pat on the back for continually fine work.

Do you know the first thing this group will do after the '59 annual convention? They'll sit down and discuss: "How are we doing to make the next one better?"

Jac takes intense pleasure from working on a team. He likes to keep the staff excited with ideas and new projects. He makes changes.

One of his finest talents, say "old hands" around A.G.A., is turning critics into positive people. Jac is equally gratified when he sees a person developing into a new industry personality.

Jac Cushman has come a long way in a relatively short time. I doubt that he has hit a zenith yet.



• Assistant to the Managing Director

As you can see from the organization chart (page 94), the assistant to the managing director, Harold S. Walker Jr. has a variety of sections, subjects, and supervision to administer. (This is not unheard of for key posts around A.G.A.) In his short, but effective, affiliation with the gas association, Harold Walker has built a fine reputation for just that. He is known as a quick, thorough administrator.

Walker graduated from the U. S. Military Academy at West Point (B.S., 1943), and topped that off with an enviable—if you like a lot of combat—military service record in both World War II and the Korean "police action." He received an M.A. from Columbia in 1953. During his service phase, he did high-level administrative work in a variety of fields. He also was an instructor and assistant professor of English at West Point for a period.

Prior to joining A.G.A. in 1955, as secretary of the General Management Section, Walker was associated with Lit Bros. Div., City Stores Inc., Philadelphia. There, he was in charge of customer and merchandising service for home furnishings, appliances, housewares, and furniture.

The assistant to the managing director administers sections and functions operating under the General Fund. His activities also fall under the familiar member-company committee system used in the association. Under Walker are the general office services such as mail room, stenographic section, switchboard-receptionist, comptroller and office manager, etc. Also on his team is one of the charming A.G.A. staff members, Gladys Hanshaw, a real gas association and industry pioneer. She was one of the original 12 employees who served under the first managing director and has been gracing A.G.A. ever since.

In addition, Walker turns his attention to the

five organized Sections—General Management, Operating, Accounting, Industrial & Commercial, and Residential—of A.G.A.

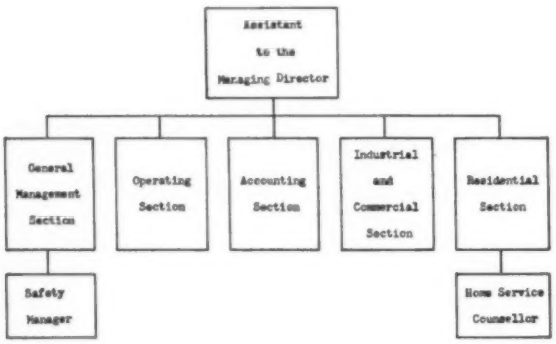
Harold Walker feels the need and likes to go to the field. For example, in 1958 he attended the three Operating Section conferences, the General Management committee meeting, some Accounting Section meetings, etc. His policy is never to sit in such groups and just take minutes. He likes to learn and talk.

His work with the Accounting Section, while perhaps not typical since this field is more parallel with his past experience, serves to illustrate the pattern of his activities. There, many original ideas are developed. However, the section seldom makes specific recommendations to gas companies. It does keep the many facets of complex accounting procedures and rules straight and on record. Thus, the Accounting Section can act as a national spokesman before regulatory bodies with jurisdiction over accounting procedures.

Walker takes particular personal pride in his work with the Accounting Section. He also gets much satisfaction out of college recruitment efforts. Advertising and other media brought some 1600 inquiries last year into A.G.A. asking about job offers and working conditions in the gas industry. These were answered with a prepared brochure. But, about 900 have come back for additional, more specific information—a very good return rate in anybody's league. Such work is vital, Walker feels, because attracting new, young minds means so much for the future.

Harold S. Walker, Jr., Assistant to the Managing Director.

Walker likes people and the feel of teamwork. He has welded good teams in the service and is forging an efficient path in his areas at A.G.A. His administrative abilities coupled with a fine attention to numerous details, make him a real asset to the American Gas Association team.



• The Organized Sections of A.G.A.

SECTION work is as much a heart of the gas association as anything. It is the traditional focal point on the national level for a huge segment of the gas industry. Traditionally, Sections are the wellspring from which so many varied activities emerge.

I wish it were possible to use several pages on the work of each section. However, something is usually better than nothing, so I have chosen the Operating Section to treat in some detail. Perhaps its "life" will illustrate adequately the scope of the operations of:

Accounting Section—Thomas J. Shanley, Secretary.

General Management Section—Vaughan O'Brien, Secretary.

Industrial & Commercial Gas Section—Ralbern H. Murray, Secretary.

Residential Gas Section—F. W. Williams, Secretary (just retired).

All of these Sections are in constant contact with membership and operate under the direction of member committees. The Accounting Section delves into customer relations, customer and general accounting, new accounting developments, electronic data processing and other subjects. It keeps its fingers on the National Association of Railroad and Utilities Commissioners; the Securities and Exchange Commission; the accounting activities of EEI; and other groups.

General Management Section provides a forum for exchange of information and ideas in finance, rates, economics, insurance, personnel, purchasing, marketing, research, claims and accident prevention.

The Industrial and Commercial Gas Section is set up to put leadership and guidance into sale of gas, gas appliances and gas equipment. It sponsors biennial Industrial and Commercial Gas schools. It works with schools and develops proper practices for installation and operation of piping and equipment in the industrial-commercial fields.

Residential Gas Section helps member companies increase the use and utility of gas service and its domestic appliances. It conducts sales conferences, prepares displays and assists A.G.A. Promotion with year-ahead sales planning.

• The Operating Section

This is the section where the operating gasman turns to trade his ideas for those of others and as a

center for information of all gas industry operations. This is important because these are the men who keep the physical side of gas systems in service during booming expansion and rising costs. These operating people are the men on the firing line. They know and appreciate the backing they get from the non-operating segments.

A study of the Operating Section Index (see accompanying box) gives readers the wide scope of interests and projects of this single Section. And it further illustrates how A.G.A. staff members actually work for the members of the Association through member-staffed committees.

The Operating Section is not only important (without shading any of the other Sections, if you please), it is big. Its membership approaches 4000—more than 50 per cent of total A.G.A. membership. It is headed by quiet, scholarly J. Stanford Setchell.

Stan Setchell is an engineer whose objective is to "help operating people help themselves" through Operating Section activities. He sees his Section as a collecting point or funnel for incoming operating and engineering information. In the vortex of the collecting point, information is put in its best-used form and flooded out all through the operating end of the gas business for all to see, learn from, and use. He does not feel that his group develops or should develop much new information. It is the agency for collecting ideas, techniques, procedures, etc., and spreading them around to operating membership for their own evaluation.

Stan has seen a lot and learned a lot in his years with the Operating Section. He has traveled to get the feel of construction and operating problems at first hand. His last child was born while he was "on the road" in Chicago. Though he is not the extrovert that is somewhat typical of other departments in A.G.A., he is very positive, softly driving, and anything but dull to talk to. He gets things done quickly and, in this respect, sets the pace for the Section staff.

Fredric A. Moshier is Assistant Secretary of the Operating Section. Fred is a talented chap tending toward the extrovert side of things. I don't know of anyone who is more prompt, efficient or willing to help than Fred Moshier. Drop him a letter, and the answer is back seemingly before your epistle nestled in the mail box. Need something at a convention and he knocks himself out to produce it with a smile. He even makes trade journal people feel at home. Mix these attributes with Setchell-inspired competence and you have a good association man.

J. Stanford Setchell (right), secretary of the Operating Section, meets with Jessie McQueen, home service counsellor, and Thomas J. Shanley, secretary, Accounting Section.

Vicki Kearney is also an Operating Section staffer who can brighten up anybody's day. She is secretary to Stan Setchell and does yeoman service, while gracing, Operating Section meetings. And I didn't hear anyone complain about her work during my visit to their offices.

Marian Lazar and Eileen O'Donovan are the other two personable members that round out a very fine Operating Section staff. Miss Lazar is secretary to Fred Moshier, while Miss O'Donovan is the Section's stenographer. These five people keep the large Section humming—and there is plenty of work and activity to furnish the tune.

Operating Section is one of the Association pioneers. It was the successor of the American Gas Light Association. It came into being as the Technical Section. One of the first things that was done was to study the needs from the days of the former associations. One important conclusion, the operating man needed a national association tie-in that would produce the maximum operating-technical information with the least effort on the part of the gas company man. This has been a guiding principle of the Section ever since.

Again, referring to the Section Committee Index, the scope and subject of operating activities are broad. In addition, the section receives many questions from operating people. These are answered directly, or the writer is put in touch with one or a group that the Operating Section knows has valid experience along the line of inquiry.

Many foreign visitors visit Setchell and crew looking for the American way of building and operating gas systems. The Section confers with them and carries it further to set up meetings with key operating-member people all over the country.

Then Operating works with a variety of standards groups. They ask and authorize gas company men to represent A.G.A. on many boards, committees, agencies, etc., with standards objectives in many fields. And Operating Section staff members are members of certain key groups. For example, many staff-member hours have been put in on reimbursement and other problems associated with pipeline or main relocation generated as a by-product of the President's (Ike's) Highway Program. The highway project is a big one and is typical of some of the behind-the-scenes effort expended by this A.G.A. group's staff.

At this point, it is obvious that Operating has many committees. The Operating staff is available for guidance and help in making these committees. Some 50 per cent of the committee people are appointed—after being cleared by their company clearance officer, of course—to two-year terms. The average period of

OPERATING SECTION COMMITTEE INDEX

(Committee and Subcommittees)

AUTOMOTIVE AND MOBILE EQUIPMENT
- Vehicle Selection, Utilization and Retirement

CHEMICAL AND ENGINEERING
- Odorization of Gas
- Gas Conditioning

COMMUNICATIONS AND TELE-CONTROL

CORROSION
- Aboveground Corrosion
- Underground Corrosion

CUSTOMER SERVICE

DISTRIBUTION
- Cast Iron Pipe Standards
- Construction and Maintenance
- Distribution Design and Development
- Metering
- Plastic Pipe Standards

A.G.A. DISTRIBUTION ACHIEVEMENT AWARD

GAS DISPATCHING

GAS ENGINEERS' HANDBOOK

GAS MEASUREMENT
- Joint A.G.A.-ASME Subcommittee on Gas Measurement

L.P. GAS UTILITY CODE

MANAGING

MANUFACTURED GAS PRODUCTION
- Builders'
- Manufactured Gas Production Planning
- Gases from Solid Fuels
- Gases from Fluid Fuels

NOMINATING

TRANSMISSION
- Compressor Stations
- Joint A.G.A.-API Committee on Oil and Gas Pipeline Field Welding Practices
- Pipeline

UNDERGROUND STORAGE
- Underground Gas Storage Statistics
- Deliverability Problems
- Gas Storage in Aquifers
- Storage Legal Forms, Documents, and Statutes
- Verifying Storage Inventory
- Underground Storage Mechanics

TASK COMMITTEE ON SERVICE TYPE REGULATORS

TASK COMMITTEE ON STANDARDIZATION OF METER PURCHASE SPECIFICATIONS

TASK COMMITTEE ON GAS MEASUREMENT MANUAL

participation is from three to five years.

The actual "power" in Operating committees appointments rests with the chairman of the Operating Committee, a gas company member. However, the incoming chairman makes his selections and then the appointments are worked out in counsel with the outgoing chairman and Section staff.

Both Stan Setchell and Fred Moshier tell me that they find most gas company operating types very eager to do Operating Section committees work. This is a fine tribute to the Section and its staff.

Conference planning and execution takes a good cut into staff-member's hours. Operating Section's meetings are big, well attended functions. At the 1958 combined Distribution, Transmission, Production conference, for example, there were over 2000 delegates and 200 speakers. Even at a separate meeting such as this year's Transmission conference in Dallas, there were some 400 delegates and 50 or so speakers. There is a lot of work put into the care and feeding of conferences of such magnitude.

First, hotels have to be lined up. Some require working five years in advance for bookings, and none less than six months. Then, each conference has a Program Committee. They set the subjects and keep repetition out. They get substantially 100 per cent agreement before they nail a program down.

Working Conference committees do more than set up conventions. The conference itself is just the visible evidence of the effort. They study past meetings, put in changes so no fixed pattern is set, they constantly survey and question operating men on what they want at meetings, work for ever-increasing effectiveness, and decide where the three major yearly conferences—Distribution, Transmission and Production—will be held. Well, where are they held? All over this broad country. As Stan Setchell puts it: "If you'll just stand still awhile, there'll be one near you." This reminds me of a single trip one of GAS' editorial staff took that had him sit in on an Operating meeting in San Francisco, another in New York, and the third in Miami, Fla.

It should be interesting to note that the Operating Section conferences are designed to be self sustaining. Registrations, etc., are set to just pay the tab, nothing more.

The Operating Section is proud of the awards it gives because they show actual achievement in action. These awards stimulate participation in Association work to make contributions to the state of the gas industry's arts. There is an Operating Section Award of Merit. In 1958 some 20 operating people became eligible for this honor. Then, there is a Distribution Achievement Award (sponsored by the American Meter Co.) to honor an individual who has made an outstanding contribution during the preceding five years.

What about "rewards" for Section staff people who put more into their positions than their remunerations imply, and more than the average gas company member is aware of?

"The remark that makes it all worth while to me," says competent Stan Setchell, "is when I hear a fellow leaving an Operating Section conference saying to a fellow gasman, 'I learned something here.' It's a long way between many gas company home offices and

some convention sites," he said, "thus, when I hear people say they are taking something home with them, it gives us all a great feeling of satisfaction."

Mr. Setchell has observed the operating end of the industry over a number of years. He notes a movement to more organized or "national" ways of doing things. This is, of course, one of A.G.A.'s purposes and is also a result of better communications and standardization. But, at the same time, Setchell sees people losing their individuality and dedication. Perhaps what he is pointing out is the loss of the esprit de corps association with the old gas-house gangs. For this, Stan Setchell sheds "a tear of nostalgia."

As we have tried to explain, however, Setchell and his Operating staff are not going to sit around and wipe away tears. They are too busy operating efficiently so that the welder, communications engineer, design engineer, compressor stations superintendents, measurement engineer and each operating man has a national center of information where he can get the maximum benefit with the least effort.

• Home Service

A.G.A. provides a full home service counseling service to the industry. The program is under charming Jessie McQueen, Home Service Counsellor, whose section is affiliated with the Residential Section.

Miss McQueen has built an international reputation in the home service field. She has much to give to gas company's home service people, those wonderful girls who make the direct, friendly contact with homemakers. They have proven that they are one of the gas industry's most effective sales promotion teams.

It takes first-hand contact to help and inspire the home service women. So, Miss McQueen does not spend a whole lot of time at her desk. She develops the annual Home Service Workshop. Those are important meetings where the participants really take something home in the form of methods, equipment ideas, and promotion suggestions to be used in training new personnel and keeping the program vital for seasoned members.

The A.G.A. Annual Convention is the site of two other important, and well received, Home Service functions. Each year a Home Service Breakfast is held. This isn't the easiest thing in the world for convention delegates to attend since it is held at an early morning hour, but it is always well attended. Actually, it has grown into quite a tradition. The addresses are outstanding events of the convention.

In every way, A.G.A.'s Home Service Counsellor is a woman on the go with four or five regional association meetings, and visiting 40 to 50 individual gas companies each year. She brings a deft touch to the demonstration kitchens and a masterful presentation from the speakers' platform. Thus, A.G.A. has given member gas companies every assistance in operating their home service department, recruiting personnel and training.

• Safety

WORKING under the General Management Section is a very vital man on the A.G.A. scene. He works toward an accident-free gas industry, spending all of his time helping gas companies promote safety in operations and cut down tragic, costly accidents. He is Safety Manager Rauel N. Papich. He is the gas industry's worst enemy of death, destruction and injury. It also makes him one of the hardest working players in the A.G.A. lineup.

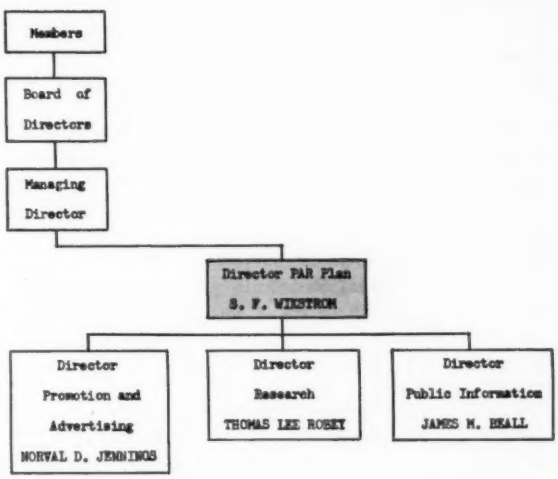
His guiding committee is the Accident Prevention Committee. Their target is to eliminate every accident among gas company employees. They have pulled down the industry's disabling injury frequency rate and severity rate. But the committee and Papich are not through yet.

A.G.A.'s Safety Manager travels the country trying to promote a functioning safety program in each member gas company. Then, from these personal contacts, from Accident Prevention Conferences, and from committee direction, he helps develop the literature, movies, programs, and other tools that will bring the message to all men in the field.

The scope of A.G.A.-led safety work extends from gas production, into transmission, through distribution, to customer service work. Naturally, there is constant effort to work on the ever-increasing automotive accident hazard.

For some obtuse reason, it is always a long, hard fight to convince people that they have to think and look out after themselves to prevent accidents. This is the type of job Papich likes and he is making his impact felt.

PAR, AND ITS DIRECTOR



JUST prior to World War II, it became obvious to some gas industry leaders that electric competition was "beating our ears off." During the war, even more competition developed. Deep thinkers were rightly predicting highly competitive conditions in the post-war economy.

Therefore, an A.G.A. Postwar Planning Committee was "crashed together" to fill the need for a plan of prompt and effective action. They decided the gas

PAR Director Wikstrom (standing, left) meets with other staff members. Seated (l to r): L. M. Hammer, promotion manager; K. F. Muldoon, advertising manager; G. P. Mullins, manager, New Freedom Gas home bureau. Standing: Wikstrom; N. D. Jennings, director, promotion and advertising; R. H. Murray, secretary, Industrial & Commercial Section; H. S. Walter, manager, Commercial and industrial promotion.

business needed: (1) to expand the sale of gas and gas-fired appliances; (2) to enhance the industry's prestige; (3) to build public acceptance of gas and its utilization equipment; and (4) to provide for continued success of the industry through research.

A master plan was developed. An initial was taken from each of the key words—Promotion, Advertising, Research—to name it. PAR was born. In 1944, then, the Promotion, Advertising, and Research Committee was formed.

The first step to take was pay for the PAR plan. It was the decision of the industry-member committee that this vital program should be funded from outside A.G.A.'s General Fund. Similarly, PAR's activities would be in addition to the Association's General Fund activities. Thus, PAR is supported by separate voluntary subscriptions from many—but not all—of A.G.A.'s member companies.

Wise counsel by the Postwar Planning Committee took positive shape in 1945. That year the gas industry launched its potentially dynamic PAR plan with a first-year budget of $1.4 million. It was just a baby then, but it was destined to grow. It was destined to bring the gas industry forward in the public mind. It has done a better job of this—just getting the public to know gas as a source of energy and as an industry with modern services and appliances—than any other industry effort. But, there is still plenty of work to be done.

One important service has been "tacked on" to the general PAR idea in the form of the PAR Public Information program. After one failure, this movement got off the ground in 1955. Since then, it has become a strong right arm of the overall PAR campaigns.

It, too, is supported by a separate subscription—separate from both the A.G.A. General Fund and PAR. (A company has to belong to PAR before it is eligible to join in with PI, but it can belong to PAR without supporting Public Information.)

To return to PAR, the gas industry sponsors have subscribed some $5 million for promotion and advertising, and $1.8 million for research this year. Sound big? Well, it really isn't when you consider that the giants of the electric industry are able to put almost $40 million in research alone. But, the whole story is not in money. You can't just spend money at random and literally "buy" an improvement of an industry's competitive position.

Seeing that PAR funds are strategically placed so that maximum effect is wrung out of each dollar is a prime objective of S. F. (Wik) Wikstrom, PAR's director. This urbanely southern-talking executive does a little bit of everything since that is about the best way to describe the vast, varied activities of the giant PAR Plan.

Wik is a sparkling speaker. In addition to this public speaking virtuosity, he brings years of gas industry "selling" experience to A.G.A. and PAR.

His philosophy is to convince those homemakers that gas is best, put the gas industry on the consumers' map, develop strongest possible promotion and back this up with expanding research. He feels that all of the areas covered by PAR and Public Information could use more money. For that, however, new and important sources of funds are needed.

Wikstrom is pleased, though not complacent, with progress to date. He particularly emphasizes the need to keep the PAR/PI momentum rolling. For, "you do not change consumer attitudes overnight. It takes a cumulative effort and study. Most important, we are gaining ground very well, but we have to keep going."

The industry is fortunate to have this man leading the PAR effort. His 16 years in gas company selling (as head of dealer and builder activities with Alabama Gas Co. and general sales manager for Mississippi Gas Co.) have given him the local utility picture and his years with A.G.A. in New York since 1953 have supplied the national-level feel. In his words, "the national program and its progress is completely effective only when local gas companies tie-in."

As an example of this thought, the Gold Star promotion is ideal. There we have $2.5 million pumped into the program from A.G.A. and blasted off on the local and regional levels with $25 million from local

utilities and appliance manufacturers.

Thus, Wik Wikstrom feels that when gas is given something like equal exposure, gas has an equal chance. His vitality (and inside him there is a lot of it as a contradiction to his outer calm) is directed at exploitation of the equal chance into a gas industry victory.

• Promotion & Advertising

Coordination of all promotional and advertising activities of A.G.A. is the job of Norval D. (he's another Dwight) Jennings. He thinks of himself as a salesman while creating policy and directing multi-million dollar programs in these fields.

Norv Jennings has an authentic Ivy League appearance (he took his degree at Yale) which probably fits into the advertising-promotion world as well as anything. From one angle he looks like Rudy Vallee; from another, the Duke of Windsor. But when it comes to "selling," Norv believes in aggressive application of every tool. He has been credited with creating the current A.G.A. policy of ready-recognition of brandname ads for printed media.

Promotion and advertising did not always have something like the current budget of $5.5 million to work with. Twenty-five years ago, the old National Advertising Committee had only $400,000 and this dropped to some $200,000 before PAR was formed in 1944. As a result, and certainly a prime reason for PAR in the first place, the electric competition had things pretty much their own way.

But now PAR has grown and is still growing. The promotion and advertising segment has the gas "word" going out in many forms to and through every media short of sky writing. It is well to briefly review what this part of PA does.

• Promotion

The Promotion Manager is Leonard M. Hammer. His unit turns out parts and packages for keeping gas continually before the eyes of the public through a mass of promotional materials. I liken it to the Sears, Roebuck for sales-type people with the gas companies. If they need a tool, Promotion has a point-of-purchase display; a pamphlet; a film strip; six booklets; a cook book or two; and several hundred premiums to work with.

Most readers who are sales orientated will be familiar with the Plan Book which is issued in multi-hued form each year. This is the score card, the line up, the directory of what promotions will be available for the year. It lists the programs—Spring Range, Refrigerator, Air Conditioning, etc.—and runs the course of sales tools and interest-quickeners available from A.G.A. for each.

To me, the Promotion part of PAR is operated as a large, master advertising agency. It turns out original ideas and physical materials for augmenting the human exchange that will result in interest in gas, gas service and sales of an appliance.

A list of A.G.A. promotion pieces would stretch for the next couple of pages. It is good stuff. I was impressed by the quality throughout A.G.A. promotion in the various media. The art work is excellent. In printed material the same is true, while makeup and layout are equally unusually good. Printing, basic stock and originality of thought certainly make these sales catalysts better than any other industry can boast.

Why go through all of this work and effort? It is another advantage of A.G.A. and, for that matter, the general concept of trade associations. The largest advantage is that these materials can be purchased in quantity and sold at minimum cost. If each gas company attempted to put out similar materials on its own, the cost per unit would be prohibitive.

• Advertising

When you think of gas industry advertising, you are drawn as if by a magnet to the gas industry's national television effort. But, there is far more to it than just that. To boil it down to statistics, in print advertising alone the advertising arm of A.G.A.-PAR, administered by capable Kenneth F. Muldoon, carried gas' message in consumer magazines with combined circulation of 38.5 million. Industrial and trade magazines carried "the word" to another 1,840,0000 potential customers.

That's big coverage in anybody's language, friends. It represents a volume and impact that our industry can be proud of. This, coupled and supplemented with manufacturer and local utility programs is getting gas off the ground. True, we don't dominate the scene, but the gas industry is making real progress. In newspapers, on billboards, via radio, over TV, on truck sides, and through the mails the gas industry is spreading the facts of domestic, commercial and industrial life about the best energy source and equipment that uses it.

No longer do you see only the praise of Reddy Kilowatt in the popular and specialized media. All of our competition now knows the gas industry is on its toes. At last, we are through talking to ourselves. We are putting thoughts into the homes, laundries and production plants where they belong. We are getting to the buyers. The people who control or directly influence the purse strings of the nation.

We have come a long way—and there are still roads that need to be traveled.

• National Television

Soon after television had established itself on the American scene, the far-sighted leadership of our industry began to realize its potential for selling the industry and its utilization equipment. We were some nine years late in getting started, but once the decision was made and special funds subscribed, PAR came up with an undisputed winner.

The gas industry shot for the best. In its search for a network program the TV Committee laid down certain yardsticks—large and varied audience, good coverage, a prime time period, good cost-per-thousand, and prestige programming—a combination most difficult to acquire in a competitive TV world! You don't need me to tell you that they came up with

PLAYHOUSE 90 and Julia Meade.

In selecting national network television to spearhead its sales program, the gas industry has put its money on the most potent sales vehicle in this age of mass communication wonders. Like ourselves, TV is an expanding industry, growing by leaps and bounds. In the short time since we entered TV in January 1957 almost 6 million additional homes have made television the center of their family entertainment. Today there are some 44½ million homes in these United States equipped with TV sets—86 per cent of American families spending an average of more than five hours a day in front of their TV screens!

Over the CBS network, PLAYHOUSE 90 reaches into some 12 million of these homes, where we are able to expose our gas sales messages to some 25 million people. Now how are you going to do that in any other way? People who make something of a pseudo-science out of the subject have learned that our program is viewed in almost half the TV homes in the country at least once each month, broadening the reach of our gas selling effort to some 50 million viewers—82 per cent of whom are *adults*, our prime prospects for gas and gas appliances! If you total up a few figures and divide once or twice you see that the cost of the gas industry's commercials amounts to just a trifle more than one-third of a cent per home exposed. This is less than a "penny" post card costs these days.

Well, after you expose the message, you have to communicate it. You have to "get it over." This, Julia Meade is doing with telling effect. Tested by a leading public opinion research group, Julia has proved tops in conviction. National studies conducted for A.G.A. show that national television has not only halted a long-term decline in consumer attitudes toward gas, but has actually brought about dramatic shifts of consumer preference in favor of gas versus competitive appliances.

This season, the advertising set-up for this very successful TV program has been changed. Between now and next June PLAYHOUSE 90 will be aired on alternate weeks—meaning that the gas industry will be one of three instead of six sponsors. During the summer of 1960 PLAYHOUSE 90 will be telecast—and gas will be its sponsor—each and every week. This gives our industry 32 shows (against 26 during the past year) and 23 per cent more commercial exposure. As always our gas commercials will continue to be seen during the prime first half-hour.

The gas industry is not irrevocably wedded to this program. Should something better come along, we can make our decision and put in our bid. At least until now, however, considering everything in balance, PLAYHOUSE 90 by far has been our industry's best choice.

PLAYHOUSE 90 is not fixed in its theme. Probably, you do not like every play. This is fine as far as the gas industry's advertising objective is concerned. Present a variety of drama, each with different story-interest levels, and you draw a variety of viewers—not just the same set that has interests keyed to specific themes.

In reaching for excellence, PLAYHOUSE 90 at times has stumbled and has provoked some unfavorable criticism. But much, much more often than not it comes up with a winner. As a result the gas industry has even been recognized by such a responsible publication as *The Saturday Review of Literature* for the contribution it is making through PLAYHOUSE 90 to bringing better television programs into the homes of the American people. Association with a program of this importance is doing much to raise the stature of gas as an up-to-date modern, superior fuel—and is doing much more than association with merely a good show with an equal number of viewers would do.

• New Freedom Gas Home Bureau

Some 98 per cent of the people who pass through a model home do not buy a house in the development. Most of them don't buy a house any time soon since they are already owners of modern homes. They are out there just looking for new ideas or for combinations of architecture and appointments that will work out in their current abode. The purpose of this segment of Promotion and Advertising is to get builders and builder trades to go gas in their everyday work. In this way, as the "just looking" consumers and actual prospective home owners flow through trade shows, subdivision spectaculars, and model homes they are greeted with the all-gas home concept.

Boiled down, New Freedom has the materials, promotional direction and know-how to pre-sell successful builders all over the country.

Early gas industry exhibits at national trade shows to such organizations as the National Association of Home Builders, were somewhat less than sensational. Various manufacturers were not coordinated so that a really matching all-gas kitchen was practical. Decorator-coordinated kitchen cabinets, as an example of one thing, were not available with gas appliance dimensional requirements. And there were other problems such as color, etc.

By way of contrast, consider this year's sparkling product of the New Freedom group, the "Blue Star Home Program." As its name applies, this is the all-gas home drive that was kicked off in Columbus, Ohio on Aug. 18. For programs like this, planning begins at least one year in advance. Builders have to be contacted and "sold," appliances have to be lined up, advertising coordinated, and the promotion pieces developed.

The New Freedom Gas Home Bureau furnishes the leadership to bring about coordination for putting all-gas homes on the road. A.G.A.'s New Freedom manager, Gerald P. Mullins, puts the whole package together so that builders can see what gas can do in the home; then wraps up the package for gas company exploitation in local areas; and gets follow-up publicity from leading shelter magazines.

• Commercial Promotion

As the name implies, this unit—under the managership of Hayes S. Walter—beams its efforts toward getting gas as the accepted fuel for utilization in

apartment houses, office and public buildings, schools, churches, industrial plants, and so forth.

To do this, Commercial Promotion develops packages for specific campaigns and backs these up with national advertising, direct mail, etc., as needed. Their programs for this year were typical, although expanded over 1958.

The first drive was a February-April commercial gas water heater campaign. Its targets were obsolete and undersized equipment. A direct mail campaign aimed at food service establishments which have water heating equipment that merely wheezes and tries for 180 deg F sanitizing rinse water, led the program. This was backed up during the promotion period with national advertising in major trade journals covering the volume feeding field. Articles and case histories were released to publications with plumbers, plumbing supply houses, and contractors as prime audiences.

The water heater drive in the commercial area was blueprinted in a free A.G.A. Commercial Promotion portfolio. It contained: samples of manufacturers' sales materials; direct selling pieces; and case histories of successful installations and conversions.

This fall, September-October, a PEP (Performance, Economy, and Profit) Commercial Gas Cooking promotion was launched. This too was a complete package, somewhat similar to the water heater program in scope and mechanics.

These are but two of the projects of this bureau. They serve to illustrate the high caliber and practical approach A.G.A. takes toward capturing the commercial market.

• Special Services

This unit of PAR handles the School Program, Metropolitan Contact efforts, and many other odds and ends of great importance.

The section sends hundred-thousands (300,000-plus, in 1958) of kits and student sheets to junior and senior high schools, and colleges all over the U. S. The idea is, of course, to get 'em gas accustomed while they are young.

Schools revised the booklet "The Story of Natural Gas" for republication in early 1959. This piece tells what the gas industry is and what gas can do. It is for school children and has the educational pitch without the commercialism of more direct promotion.

Then, there is a comic-book style booklet—"The History of Gas"—which was also revised. The kit, "Science Principles and Your Automatic Gas Range," was updated to include thermostatic gas burners.

In cooperation with GAMA, The Schools Program has put together a filmstrip, "Look to the Future—The Gas Company in Your Community," and there are other publications and kits.

The Metropolitan Contact group builds public acceptance for gas and the gas industry by developing active contacts with key opinion-forming agencies and individuals.

Complete gas kitchens and laundries, gas appliances and equipment, information and service are provided at points of greatest impact—national magazines, New York daily newspapers, food companies, advertising firms, photographic and film studios, TV networks, etc. Typical of this representative's work was the placement of gas equipment in a Chinese Cooking School, an activity of the China Institute of New York with the cooperation of GAMA.

• Field Program

A.G.A. through PAR has four field representatives —Ray Cooper, Dallas; Paul Inskeep, Detroit; Bob Laux, New York; and Pat Nicholson, Los Angeles— who keep their fingers on the pulse of the major sections of the country. They are in the field and travel widely to keep abreast of current developments, and give personal counseling and assistance to member gas companies.

In addition, periodic meetings between this field force and the New York staff members keep the latter tuned to problems and progress in the field. The representatives are continually on call to members. They have well rounded educations and experience in the gas industry. Their activities are financed by PAR.

• Public Information

The development of the Public Information program has been called by NEGA's Clark Belden ". . . the story of a bloodless revolution—a revolution that transformed the gas utility industry in four years into a vigorous young giant with a strong public relations voice."

In the period prior to 1950, the A.G.A. public relations effort, while meeting with minimum success, was under-funded for the job that needed to be done. Since the gas industry was growing by leaps and bounds, interested gas company executives recommended formation of a committee to study the need for gas industry public relations and how this need might be met.

A special Committee to Study Public Relations recommended that the industry immediately initiate a new national program to develop an informed and understanding public. This effort was aborted due to the difficulty of raising adequate funds.

The thought was then submitted that perhaps PAR could add public relations to its already far-flung wide variety of activities. Thus, after appropriate study and planning, the 1955 PAR program added a fourth branch, "PAR Public Information."

Committee work guides the path of this program as is the case of all other A.G.A. activities. A 41-member PAR Public Information Task Force helps A.G.A. staffers keep the program rolling in line with the needs of PAR/PI subscribing companies over the length and breadth of the U. S. Take another look at the even broader member-subscriber control of direction for this effort.

A Public Relations Committee made up of some 23 public relations directors originates the projects and stimulates the program's activities to success. Then, 17 gas company executives form a General Planning Committee which sets the overall policy, and originates and controls the budget.

The purpose of PAR/PI are simple:

1. Win employee understanding and support for the investor-owned gas industry.

2. Present the facts concerning the growth of government in the gas business.
3. Stimulate coordinated public relations action on the local level.
4. Supply the gas industry team with public relations tools for local use.
5. Build a national canopy of favorable publicity on gas.

To get every gas company employee headed down the PR trail, PAR/PI holds live Regional Workshops all around the country. Here, in shirt-sleeve sessions PR men exchange views and work together on mutual problems with each other under the soft guidance of either A.G.A.'s Public Information director, James M. Beall or his assistant, Henry (for Hank) Littlehales. The prime objective of early workshops was to arouse interest in the PR activities on the local level. This objective is not forgotten today; however, problems and their solutions have been working into more of the current workshops.

If your company has an internal magazine, you have undoubtedly read the serialized "You're the Expert" cartoon panels, and "This Is Your Industry" feature articles which are produced by Public Information.

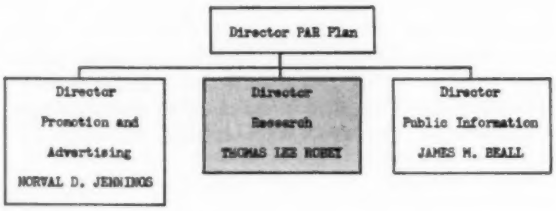
Government continues to bore deeper into the gas industry's operations. "Public Ownership Trends," published under the PAR/PI program, is the only tool I know of that can keep investor-owned gas company men right up to date on this trend. And some strong tools are provided to help direct efforts of gas companies to meet, and best municipal ownership problems.

INTERCOM, the gas industry's slick, fast-paced newsletter dealing with public relations news and views is another service of Public Information. This and special awards are designed to help and augment gas companies with their local PR chores.

And PAR Public Information turns out other tools that can be put to work on the local PR front. This year you had a $65,000 nationwide opinion survey (a joint project of PAR/PI and INGAA); a National Public Relations Conference; an ad mat service; a speakers kit complete with 50 colorslides; a "Preparedness Kit on Government in Gas"; an exchange post for institutional ads, constructive pamphlets and speeches; and other materials on free enterprise; five new booklets on gas industry economics; a new four-color booklet "Natural Gas in America"; press kits; special newspaper supplements; and more additional literature reaching nearly to ad infinitum.

Heading PAR Public Information is small, wiry Jim Beall, who can turn a neat phrase and smash tennis balls about a court with the best. He is nearly a plank-owner of A.G.A. and a vital spark in the industry's chronic problem of building understanding and acceptance of the gas industry. He is both serious and able.

Jim Beall feels that "the heart of the industry's PR effort must be good performance and good corporate citizenship." He is one man that practices what he preaches. He is doing his very best to help PAR Public Information help its subscribers and other gas companies in this far-flung industry.



• Research

Putting aside the PA in PAR and taking a close look at the Research "R", we find another arm of A.G.A. dedicated to improvement of the competitive position of the industry. The scope of this struggle for the on-top position extends from the bottom of the hole (well) to the top of a customer's vent—and all areas therebetween.

Prior to formation of PAR (1944), A.G.A. had done some research. A project on coking coal was sponsored in 1933. Domestic utilization work followed in 1935. Shortly thereafter, research stuck its investigative head into commercial and industrial utilization.

These were but small steps compared with the giant one taken when PAR came on the gas industry scene. This pulled various research groups together and added some other areas and responsibilities.

Some 250 gas company people, from all over the country and from president to technician, man the committees responsible for PAR's Research effort. They have the guidance and counsel of the staff. They are an important part of the liaison between Research and the industry. Committees develop most of the projects. And, they keep an eye open to make sure that others' research isn't simply duplicated.

Sitting in the cloud-nine spot, but with his feet at the perigee in A.G.A.'s research orbit, is Thomas Lee Robey—a gentleman's gentleman and an engineer's engineer. As Director of Research, Lee Robey may prove to hold as much of the future in his two busy hands as any other individual in the industry. I say this because many industries have found that their progress and, in some cases, very existence rested on "to research or not to research." With nuclear energy just over the hill, exotic fuels being developed every day, with direct energy conversions being played with, etc., our industry must both protect and advance itself through constant research.

Robey's hands stay on some 70 different research projects, in as many fields. The PAR research budget for 1959 was about $1.8 million.

Is this enough? A recent study by Battelle Memorial Institute said no. In view of the sophisticated energy from "new" sources and the old reliable competition-electricity, oil, and coal—the study recommended PAR Research budget of $2.5 million in 1960; and, by 1965, the PAR research funds should be not less than $6 million. A total industry research expenditure of $14.5 million is recommended for that year. That's big money until you consider that the electric industry spent $42 million for research in 1958.

Our industry can't match our competition in dollars

spent. But, as Robey says, we can get the last inch out of every dollar that is sent researchward.

Robey does not let his thinking or that of his staff become limited or inhibited. And they use the personnel and physical facilities of others on a contract basis as this seems the more economic, efficient approach rather than building, equipping and manning labs to handle a wide diversification of projects.

Here is some of the A.G.A. Research philosophy stated by Robey:

"It seems to me that research improvement of our competitive position is double-barrelled—first, it improves our position in a material way and secondly, perhaps overlooked, in a non-material—intangible—but certainly no less important and effective way.

"The material aid is the one that everyone knows about and that is reported everyday in the newspapers—improved and new *things*, as appliances and equipment, new and improved processes, methods and tools. These are the things to which a value may be assigned; they are the hardware things that you can see and feel; they are the processes that save money by producing more economically, i.e., better cost or better quality or better, more automatic operation.

"Now, the non-material and intangible research areas are those which have not as yet developed into application or hardware form; technical information in our particular areas and perhaps most important, the impact and influence of our research on others within and outside our own industry—efforts which are widely beneficial, but which are difficult to put a dollar value on. One such aspect of our research, often overlooked is 'pump priming.' Whenever A.G.A. enters a field, others in that field take notice and this has resulted in their going to work, in effect multiplying our dollars and hastening development. Air conditioning is an example.

"Even less tangible, but still quite apparent, is the impact of our research on the financial fraternity—you don't have to tell them research is necessary—they know it! And this fact, that we, as an industry are doing effective research, is certainly helpful in our dealings with them."

Take a very brief look at just a few of the Research projects that are producing these material and non-material benefits:

Multimatic wall.
Use of foaming agent to clear wells.
Gas cleaner evaluation.
Noise abatement study.
Meter pulsation study.
Branch connection study.
Line pipe investigators.
Radioactive tracers for flow determination.
Solar flare—long-range weather forecasts.
Synthesis gas from coal.
Gas chromatography.
Three domestic range studies.
Forced circulation for commercial ovens.
Lizenzia 'sorption unit.
SRI improved absorption air conditioning units.
Continental engine.
Onan 5-ton air conditioning unit.
Free piston engine-compressor.
Study of flame fundamentals.
Soil adsorption of odorants.

Such projects get started as an idea from (usually) the industry, committees, the A.G.A.-PAR Research staff, other research groups, inventors, etc., and what have you.

A systematic effort is made every year to make the program fully responsive to current and future needs of the industry. The chairmen of all Operating Section Technical Committees are asked to submit their ideas by letter.

Research, however, is itself the most prolific breeder of new ideas and it is inevitable, therefore, that the bulk of research proposals originate within the Research committees and the research agencies working on current projects. The result is always more proposals than the available money will support.

You will not have much of a research program if selection, assignment, and conduct of projects are not skillfully made. Selections of projects at A.G.A. rest on sound technical information, but the final choice is based on informed business judgments. Such factors as these are involved:

1. Industry need.
2. The proper ratio between long-term and short-term development projects.
3. The proper ratio between development of "hardware" and fundamental research.

Sometimes consultants are called in to review the feasibility of a suggested project. They are often in position not only to give the "go" recommendation, but to provide helpful paths the project should take. Usually, this means net money saved rather than spent.

Research proposals must, then, compete with each other for birth. It is a constant battle for a project to be selected, funded and sent down the road toward hoped-for success—the battle is with other projects. The judge and final jury is, as always in A.G.A., industry-member committees.

Once a project has won its battle—which is just a way of saying that the projects much compete and funds allocated must be scrutinized with great care—a research agency with brains and equipment to prosecute the project is selected.

Due to the close association of A.G.A.'s Laboratories Research division and the Institute of Gas Technology with the industry, every consideration is given them. But, as Lee Robey points out: "The final decision is based upon the main Research Committee's judgment of where the project can be handled to the best advantage of the gas industry."

The placement of a project involves negotiation of a contract with the research agency. Each project is contracted for one year's work. However, this does not mean that a project is worked for one year only; rather, work is usually broken down under what amounts to separate phases (approximately two years). Thus, a project may last eight years, for example. But it is in keeping with the policy that commitments must be held within a period of fund availability.

The whole set up is flexible. Supervising committees can modify stated objectives, experimental pro-

cedures, kill the project, or enhance it as needed.

The nation's finest research agencies from universities, government agencies, institutions, and business and industry are utilized. A list of research facilities used by PAR Research reads like a "Who's Who of Science."

That, then, is the basic concept of the research program. It may not be the fastest approach, but it is one that conserves dollars without restricting the over-all scope of development. Crash programs are expensive. Unplanned programs are even more so. A.G.A.'s approach demands careful planning to assure valid sallies at the problem. The committees have the best available technical advice from Research's staff and from outside, but in the final analysis decisions and actions are not delegated to purely technical advisors. The decisions are business decisions coming from the business end of the industry.

It is safe to say that the research organization evolved by A.G.A. and PAR is not even challenged by the best similar group of any other trade association in breadth; depth of contact from trench bottom to top executive floor; and in flexibility to meet the needs of changing situations.

Members of the Research staff include:

Thomas Lee Robey—Director.

Robert B. Smith—Assistant Director.

Roy A. Siskin—Utilization Research Engineer.

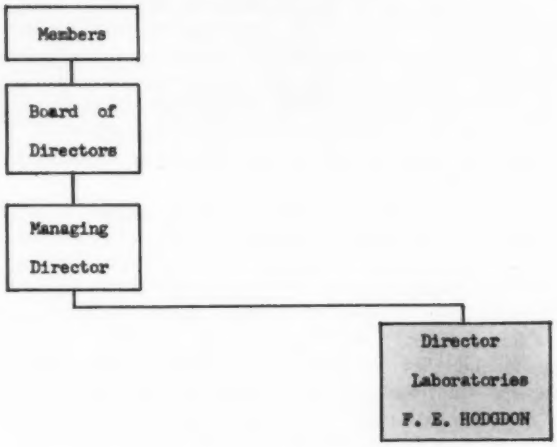
William F. Morse, Jr.—Research Engineer, Operations.

Samuel J. Cunningham—Research Engineer, Pipeline.

Robert C. Kluthe—Research Assistant.

N. K. Chaney—Consultant.

LABORATORIES



"To promote and develop the gas industry to the end that it may serve to the fullest possible extent the best interests of the public."

THUS reads a plaque on a wall at the American Gas Association's Cleveland laboratory building and since 1925, the dedicated men there (and in the Pacific Coast Branch Laboratory in Los Angeles) have been doing exactly that.

The Cleveland laboratory came into being following the 1924 annual A.G.A. convention when a management committee was selected. On May 1, 1925, R. M. Conner, head of Portland Gas & Coke Co.'s appliance testing section, was selected by A.G.A. to organize and direct the new laboratories which were built in Cleveland, a site chosen due to its location in the heart of appliance manufacturers' area.

The original building, rented quarters on the second floor of an East Ohio Gas Co. property, housed exactly four employees. The following are financial figures for the first year's (1925-1926) operation:

Revenue derived from Testing Dept.	$36,660
Revenue derived from Inspection Dept.	1,427
Expenditures for research and requirements	14,846
TOTAL	$51,933

Compare this with the latest budget that shows $1,226,000 for testing and inspection; $300,000 for research, and $125,000 for approval requirements investigation. These figures total $1,651,000. There are now 185 people working in the Cleveland Laboratories and 35 more in Los Angeles (where only testing and inspection functions are performed). Laboratory floor space has grown from 3600 sq ft to 166,350 sq ft.

At left is the main entrance to the A.G.A. Laboratories.

In 1926, the first sets of requirements for ranges, space heaters and gas hose were adopted. Baltimore was the first city to adopt ordinances requiring use of A.G.A. approved appliances. Two years later, the Laboratories were moved to their present address (1032 East 62nd Street) and in 1931 the West Coast branch was opened. In 1950, the south wing was added to the Cleveland building and four years later it became necessary to construct the north wing.

Frank E. Hodgdon, a man with a penchant for words, an engineer's insatiable curiosity, and one who considers the meal you eat at 7:30 a.m. should be your lunch, is the Director of the A.G.A. Laboratories. A graduate of Georgia Tech (B.S., Mechanical Engineering, '39), he moved into his present post in 1956 as the successor to the late Edwin L. Hall. Twenty years of service in the Laboratories (including a tenure as a Captain in the Army during World War II) prepared him for the Director's position.

Basically speaking, the Laboratories are supervised by the Laboratories Managing Committee of A.G.A., which is a committee reporting directly to the A.G.A. Board of Directors. Committee executives are appointed annually by the Association's president (although due to the continuity of the work involved, the continuing term of office for these executives may total 10 or more years). Hodgdon reports monthly directly to the Chairman of the Managing Committee and, of course, to the Managing Director of A.G.A.

What, then, are the functions of the Laboratories and the people therein? Summarizing all the complexities into as tight a sentence as possible, Hodgdon puts it this way: "We are responsible for rendering technical assistance of many different kinds to the gas industry in the field of its appliances." That is the picture in its broadest scope. Specifically, it is the following:

1. Testing—where the Laboratories are the gas industry's agency to accept from manufacturers new models of appliances and to determine by test whether or not those appliances conform with the appropriate American Standard.

2. Inspection—to keep an eye on the manufacture and production of these approved appliances so that they continue to be made in the same form that they appeared in when they were tested.

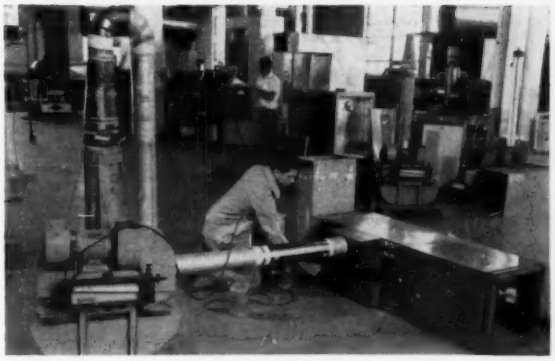
3. Research—broad, fundamental studies into the fields of domestic, industrial, commercial and mixed gases.

4. Approval Requirements Activities—day-to-day secretarial and investigational work in assisting industry committees to maintain specific standards, keeping them up to date and developing them.

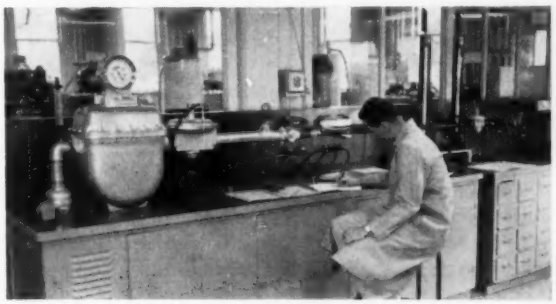
As can be seen from the budget, the first two functions constitute about 80 per cent of the Laboratories efforts. The remaining 20 per cent is devoted to the research projects on appliances and approval requirements activities. Since the testing and inspection functions do make up the bulk of the Laboratories' work, perhaps a step-by-step outline of this type of work is in order here:

• 1. The manufacturer with a new model gas appliance writes to the Laboratory requesting a test date

Director Frank Hodgdon



Collecting flue gas sample from horizontal-type furnace when operating with a downdraft at the draft hood outlet.



Determining pressure drop and regulation characteristics of an appliance pressure regulator at A.G.A. Laboratories.

Researchers checking performance of an experimental top burner thermostat design.

Collecting a sample of the combustion products from a domestic gas range (1926).

Thermocouple test setup used to determine temperatures on combustible materials adjacent to a built-in type domestic oven.

for his appliance. This is done about five to six weeks in advance of the expected test date, and sometimes while the appliance is still on the drawing boards.

• 2. A letter is sent from the Laboratories to the manufacturer telling him of the scheduled test date and asking usually for more detailed information on the appliance.

• 3. Prior to or on the test date the appliance arrives by truck and is received at the Laboratory loading dock. One of the manufacturer's engineers is usually present and the appliance is tested.

• 4. After all the requirements (as previously set forth by the approval requirements group) are met, the appliance goes to the description department where draftsmen check the manufacturer's drawings for accuracy.

• 5. The manufacturer gets a detailed test report outlining all of the test work done together with an invoice, and if further work is not required, also receives an approval certificate. Copies of these reports and descriptive material on the appliance are filed in both the Inspection and Testing departments. The appliance will then be listed in the Directory of Approved Appliances and Listed Accessories.

• 6. Inspection of the appliance on the assembly line follows.

• 7. Each appliance is always subjected to at least one annual inspection, which is announced in advance, and at least one that is unannounced. In some unusual cases, an inspection of appliances has been conducted every week for two months. The approval period is five years from the end of the year in which the appliance was first okayed. A certificate of approval is issued annually, pending satisfactory inspection reports. After the five-year period, the manufacturer must re-submit the appliance to make sure it complies with the changes in the standards which have occurred during that time. The cost of these functions is borne by the manufacturer.

R. V. Myer is Assistant Director of the Laboratories, and the Testing and Inspection departments are under his management. Walter B. Kirk is the Chief Research Engineer and R. E. Cramer is the Chief Standards Engineer.

Serving under Cramer is Forrest G. Hammaker as Chief Methods Engineer. In this capacity he is administering the Laboratories newest function, its National Field Observation Program. This program was outlined at the A.G.A.'s Research and Utilization meeting in Cleveland last May. The primary purpose of this program is to provide an organized way for utility people to report all manner and kinds of difficulties with appliances to a central agency which can make card records on them. Then, if any one fault begins to show up all over the country, very fast action can be taken to straighten it out.

The work of the Research Department is obvious. The accompanying table is a list of research projects under way at the Laboratories last summer. The Laboratory people themselves do not process requests for research projects. These are directed to the proper research committee through the Director of Research, T. L. Robey, of A.G.A. headquarters in New York City. Depending upon the nature of the project, it is then assigned to a research organization selected by the sponsoring committee. It may go to the Institute of Gas Technology, or to the Battelle Memorial Institute, or to a university such as Illinois, or it may be assigned to the Cleveland Laboratory. There working outlines are drawn up and cost estimates are submitted back to the appropriations committees.

After approval by this committee, the Cleveland people complete the project and file a report on it.

Many of the appliance projects are now being finished off with demonstration models.

In the Approval Requirements field, the Laboratory's function is to offer the A.G.A. Approval Requirements Committee, A.S.A. Sectional Committee Z21 all of the secretarial and technical assistance which it requires in the performance of its duties in establishing and maintaining standards for gas appliances. A.G.A. appropriates the funds for these activities.

The dedicated men who work in the A.G.A. Laboratories come from all over the U.S.A., and from Europe and the Orient. Hodgdon is, as previously mentioned, a Georgia Tech man. His administrative assistant, Pieter Root, was graduated from the University of Amsterdam. Others have come from the West Virginia Institute of Technology, University of Cincinnati, Case Institute, UCLA, University of California, and from the University of Tokyo. Many of them come to the Laboratories directly from college (even having spent some of their summers working in the Laboratories while still in school). Others have come from gas companies and appliance manufacturers.

Dedicated men? Yes. Ask Hodgdon about this and he will immediately offer Walter Kirk, his Chief Research Engineer, as an example. Kirk has turned down several offers to work elsewhere in the industry. He prefers to stay in the A.G.A. Laboratory. Why? "I think you'll find that a lot of engineers are that way," Kirk answers. "I can name at least four men in my department that have turned down job offers. They like to do the type of work they're doing. I don't known how you define it but we live by the words on the Laboratories' dedication plaque. (Quoted at beginning of this article.) Generally, a private organization may have special interests of its own, regardless of how fine an organization and set of policies it has. It's this small difference, I think, that keeps us here."

A tour of the Laboratories has an Alice in Wonder-

Laboratories research engineer collects data during a study of combustion chamber environment on flame characteristics of atmospheric gas water heater burners.

Research engineer checks baking characteristics of experimental high speed commercial type bake oven.

RESEARCH PROJECT TITLES

Project	*Title*
DA-2-C	Study of domestic range top section design
DA-3-C	Development of improved domestic gas ranges
DA-5-C	Study of domestic range broilers and ovens
DA-6-C	An investigation of various methods of attaining reduction of kitchen appliance operation heat losses to the surrounding atmosphere
DA-7-C	Combination top burner and thermostatic control design investigation
DA-8-C	An exploratory study of improved domestic range grate design and appearance
DAG-4-C	Field study of the newly developed flexible appliance connector
DA-2-GU	A study of more effective use of secondary air to support atmospheric gas burner flames
DA-6-GU	Ignition of gases
DA-8-GU	Determination of factors causing lint collection on the under side of burner ports
DA-5-HA	Investigation of elements of gas appliance vent system design
DA-6-HA	Design factors of gas heating appliances for more effective use of heat exchange surface
DA-8-HA	Appliance combustion and draft hood spillage safety controls
DA-2-WH	The application of heat to domestic gas storage water heaters
DA-6-WH	Investigation of non-integral storage tanks and water heating devices and other non-conventional water heaters
IA-9	Determination and control of proper oven environment for baked foods.
IA-12	A study of the principles of commercial gas kitchen ventilation system design and application
IA-14	Investigation of infra-red energy production with gas burners
Za-25	Standard ratings of gas-fired air conditioners
DA-4-M	Dumping, and ash disposal with domestic gas-fired incinerators

land atmosphere about it. Sometimes a visitor is not quite sure it is all real. Take, for instance, the sight in one room of men scurrying back and forth carrying what looks like a moonshiner's jug. Actually, they are carrying samples of flue gases to an infra-red type CO detection unit. In another room, you can find engineers baking and testing layer cakes as meticulously as Betty Crocker ever did. What they are probably doing, though, is checking the baking characteristics of an experimental high speed commercial oven. Some 1500 layer cakes were baked in the gas range section of the Laboratories Testing Department last year. Over 50,000 ft of thermocouple wire was used in the Laboratories in 1958 as well as approximately 9,160,000 cu ft of natural gas, 15,400 lb of liquefied petroleum gas and 5800 lb of propane.

Looking over testing records in the laboratory where in 1955, alone, 5600 gas appliances were tested, the engineers have a favorite saying. "When we die," they relate with what is almost dead seriousness, "the first thing all of us are going to do is to check the ambient temperatures in Hell."

If they get there, they may just do that, too.

A.G.A. Laboratories at Cleveland.

SUMMARY

THE purpose of this story is to present a study in depth on the scope and variety of the American Gas Association's activities. Frankly, it can't be done on paper short of creating a two or three volume book. There is just too much going on in A.G.A. every day to capture the whole. Perhaps the portion—and it is just a portion—in this article will be representative if not complete.

The gas industry should pat itself on the back for spawning and furthering a trade association such as American Gas Association is. As I have said before, it is far away superior to most, if not all, similar organizations. I personally know of no other association in the same league.

There is little doubt in my mind but that many A.G.A. staff people could obtain more highly-paid employment if they desired. I know many have had more than one offer in this direction. At A.G.A. their salaries are about in mid-ground of the range paid for similar positions by member gas companies. But, through leadership and by giving people something productive to do and letting them do it on their own, A.G.A. has assembled a fine, working staff.

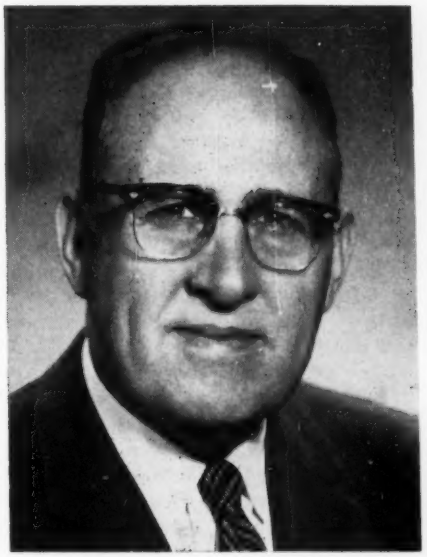
I like A.G.A. because they don't try to impress you. They talk straight and do not pussy-foot around like some association people. Several people told me that they had made mistakes. Actually, the Association has the attitude that it is not perfect; and, it would rather be trying to do something and perhaps make a mistake or two rather than do nothing and stay "safe."

American industry today is big. The era of the small, independent business that looks out just for itself and lets the rest of the world go by is dead.

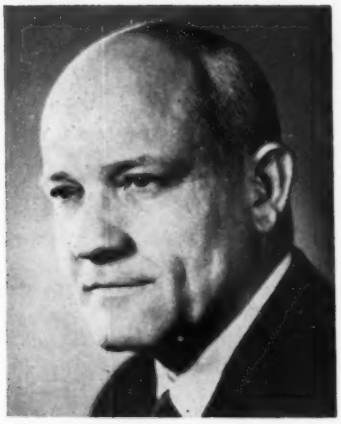
National planning and leadership is vital for survival in the business jungle of modern economy. Only through a national spokesman and industry-wide unity can the gas industry effectively fight the menace of increasing government intervention and control of the gas business or government sponsored competition.

The American Gas Association has the hard-headed business approach to serve its industry in these respects. It is not trying to preserve itself at the expense of an industry. It is not perfect, but neither is your gas company or my magazine.

The job is not complete. The gas industry can, and probably will, continue its record-making expansion. Certainly, the role played by American Gas Association will become even more directly related to this growth and health. All of us, then, are only smoothing our own paths to more success when we lend added support and participation to American Gas Association during the more trying years to come. ■



For President: Ligon



For 1st V-P: Potter

For 2nd V-P: Smoker

For Treasurer: Miles

Visual presentations highlight convention

TOP speakers from government, industry and education will address an estimated 4,000 delegates and guests during the American Gas Association's 41st annual convention Oct 5-7 in Chicago's Conrad Hilton Hotel.

Heading the list are the Hon. Fred A. Seaton, U. S. Secretary of the Interior; Dr. Keith T. Glennan, administrator of the National Aeronautics and Space Administration; and Erwin D. Canham, president of the U. S. Chamber of Commerce and editor of the *Christian Science Monitor*.

Convention planners are adding a new dimension to this year's general sessions, dramatizing addresses with colorful visual presentations. Special rear-projection equipment will be installed behind the speakers' platform to flash illustrations on a giant screen visible from any seat in the Hilton's grand ballroom, site of all general sessions.

Delegates representing 8300 gas industry members throughout the world will be greeted by Mayor Richard J. Daley of Chicago in the first morning session Oct. 5.

President J. Theodore Wolfe of the American Gas Association will set the convention theme, "New

Horizons for Growth and Service," in the opening address. Wolfe also is president of Baltimore (Md.) Gas and Electric Co.

Featured speakers at the first session will include Dr. Glennan, who will discuss "New Horizons for Research," and E. A. Norman, president of the Gas Appliance Manufacturers Association, whose title is, "To Market, to Market." Norman is president of Norman Products Co., Columbus, Ohio, and an A.G.A. director.

The Oct. 6 general session on the theme "New Horizons for Finance, Legislation and Management" will be opened by Canham, who will discuss "The World and National Outlook." Dr. Ezra Solomon, professor of finance at the University of Chicago, will speak on "The Fabulous Sixties," and George R. Perrine, chairman of the Illinois Commerce Commission, will discuss "New Horizons for Regulation, Too."

The gas supply outlook will be explored during the third general session Oct. 7 when addresses will be tied to the theme "New Horizons for Energy and Supply."

Canadian prospects will be discussed by C. O. Nickle of Calgary, Alberta, publisher of The Daily Oil Bulletin, editor of Oil in Canada and a governor of the Canadian Petroleum Association.

The nation's long-term requirements for all forms of energy will be presented by Secretary Seaton. The natural gas picture will be outlined by John H. Murrell, president of DeGolyer and MacNaughton, Dallas oil and gas geologists.

G. Herbert True, director of creativity research for Visual Research, Chicago, is slated to address delegates and guests at the convention's general luncheon set for Wednesday noon, Oct. 7. Basing his presentation in part on a survey he now is conducting among some 1000 gas industry executives, True will speak on "New Horizons for Sales."

Four new officers and 15 directors will be elected Oct. 7. Nominees include Wister H. Ligon, president of Nashville (Tenn.) Gas Co., for president; Lester T. Potter, president of Lone Star Gas Co., Dallas, for first vice president; Edward H. Smoker, president of The United Gas Improvement Co., Philadelphia, for second vice president; and Vincent T. Miles, treasurer of Long Island Lighting Co., Mineola, N. Y., for treasurer.

The association's five sections—accounting, general management, industrial and commercial gas, operating, and residential gas—all have scheduled afternoon technical sessions during the three-day Chicago convention.

The general management section will hold luncheon and afternoon meetings Oct. 5. Featured speaker will be Dr. J. T. Rettaliata, president of the Illinois Institute of Technology, whose topic is "Today's Investment in Tomorrow's Growth." Section officers will be elected, and President Wolfe will present the association's annual Safety and Public Relations Achievement awards.

AGA itself will receive an award from the National Safety Council during the general management section meetings. The award, citing the association for its occupational safety activities in developing pro-

OFFICERS

President, WISTER H. LIGON, president, Nashville (Tenn.) Gas Co.; 1st vice president, L. T. POTTER, president, Lone Star Gas Co., Dallas; 2nd vice president, E. H. SMOKER, president, United Gas Improvement Co., Philadelphia; treasurer, VINCENT T. MILES, treasurer, Long Island Lighting Co., Mineola, N. Y.

DIRECTORS

J. THEODORE WOLFE (outgoing president), president, Baltimore (Md.) Gas & Electric Co.; WENDELL C. DAVIS, president, Cribben & Sexton Co., Chicago; BUELL G. DUNCAN, president, Piedmont Natural Gas Co., Charlotte, N. C.; ROBERT E. GINNA,* chairman of the board, Rochester (N. Y.) Gas & Electric Corp.; ELISHA GRAY II, chairman of the board, Whirlpool Corp., St. Joseph, Mich.; HALL M. HENRY, president, NEGEA Service Corp., Cambridge, Mass.; JOHN E. HEYKE, president, Brooklyn (N. Y.) Union Gas Co.; OAKAH L. JONES, vice president and general manager, Consumers' Gas Co., Toronto, Canada; RALPH T. McELVENNY, president, Michigan Consolidated Gas Co., Detroit; S. LLOYD NEMEYER, president, Milwaukee (Wis.) Gas Light Co.; ED PARKES,* president, United Gas Corp., Shreveport; JOHN C. PARROTT,* president, Roanoke Gas Co., Richmond, Va.; JOHN W. PARTRIDGE, President, United Fuel Gas Co., Charleston, W. Va.; N. R. SUTHERLAND, president, Pacific Gas & Electric Co., San Francisco; S. D. WHITEMAN,* president, Kansas-Nebraska Natural Gas Co., Hastings, Neb.; JOHN H. WIMBERLY, president, Houston (Texas) Natural Gas Corp.

* Renominated.

SECTION OFFICERS

Accounting: chairman, C. H. MANN, treasurer, Columbia Gas System Service Corp., New York; vice chairman, REINHOLD H. JOHNSON, general auditor, Brooklyn (N. Y.) Union Gas Co. *General management:* OTTO W. MANZ, JR., executive vice president, Consolidated Edison Co. of New York; vice chairman, GORDON C. GRISWOLD, vice president and treasurer, Brooklyn Union Gas Co. *Industrial and commercial:* chairman, F. A. KAISER, vice president and general sales manager, Michigan Consolidated Gas Co., Detroit; vice chairman, L. J. FRETWELL, director, commercial and air conditioning sales, Oklahoma Natural Gas Co., Tulsa. *Operating:* chairman, J. T. INNIS, vice president, Northern Natural Gas Co., Omaha; 1st vice chairman, SAMUEL W. HORSFIELD, vice president, Long Island Lighting Co., Garden City, N. Y.; 2nd vice chairman, H. L. FRUECHTENICHT, director of gas procurement and development, Consumers Power Co., Jackson, Mich. *Residential gas:* chairman, H. WILLIAM DOERING, manager, heating department, Springfield (Mass.) Gas Light Co.

Davis

Duncan

Ginna

AGA DIRECTORS

Gray

Henry

Heyke

Jones

McElvenny

Nemeyer

Parkes

Parrott

Partridge

Sutherland

Whiteman

Wimberly

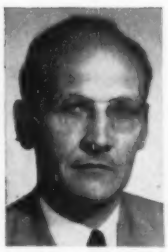
Wolfe

grams among gas industry member companies, will be presented to Wolfe by Howard Pyle, council president.

The operating section will meet Oct. 5 for its only formal session. In addition to elections and the presentation of the annual Distribution Achievement Award and Operating Section Award of Merit, the afternoon program will feature a "presidents' panel" in which five past presidents of AGA will discuss "New Horizons for the Operating Man."

Utility company home service directors also will meet Oct. 5 for their annual Home Service Round Table. Speakers will be Karin L. Morsch, Northern Illinois Gas Co., Bellwood, Ill.; Mrs. Evelyn Kafka, AGA utilization bureau, New York City; Mrs. Kathryn B. Niles, Poultry and Egg National Board, Chicago; Lucy Slagle, Atlanta (Ga.) Gas Light Co.; Mrs. Shirley B. McGillicuddy, Southern Counties Gas Co., Los Angeles; and Mrs. Elsie M. Alcorn, Milwaukee (Wis.) Gas Light Co.

SECTION OFFICERS



Mann

Johnson

Manz

Griswold

Kaiser

Fretwell

Horsfield

Innis

Fruechtenicht

Doering

Television's Fran Allison, of "Kukla, Fran and Ollie" will be featured at the annual Home Service Breakfast Oct. 6. Speakers also will include E. Carl Sorby, vice president of Geo. D. Roper Sales Corp., Kankakee, Ill.; President Wolfe; and C. S. Stackpole, managing director of the American Gas Association.

Wolfe will present the Order of Account Merit awards at the Accounting Section's meeting Oct. 6. Speakers will be A. R. Colbert, chairman of the accounts and statistics committee, National Association of Railroad and Utilities Commissioners, and chief of the accounts and finance department, Wisconsin Public Service Commission; Allan G. Mitchell, comptroller, Philadelphia Electric Co.; and O. K. Boyd, assistant vice president, Baltimore Gas and Electric Co. AGA's residential gas section will meet with the industrial and commercial gas section for a joint sales session Oct. 6. Highlights of the program include award presentations and addresses by Lester T. Potter, president of Lone Star Gas Co., and Edward J. Neeland, consultant on community and business relations service, General Electric Co., New York City.

During the joint meeting, President Wolfe will present the AGA Industrial and Commercial Achievement Award, sponsored by Moore Publishing Co., and the Home Service Achievement Award, sponsored by McCall's Magazine.

More than 25 manufacturers of mobile heavy-duty construction, operation and maintenance equipment will participate in a 10-acre outdoor exhibit, "New Tools for Growth and Service," to be presented Oct. 4-8 under the sponsorship of the operating section.

The equipment exhibit, new to AGA convention programs, will be climaxed by demonstrations scheduled for the afternoon of Oct. 6. Chartered buses will shuttle between the Conrad Hilton and the exhibit site. Buses also will be scheduled so delegates may inspect Institute of Gas Technology facilities on return trips.

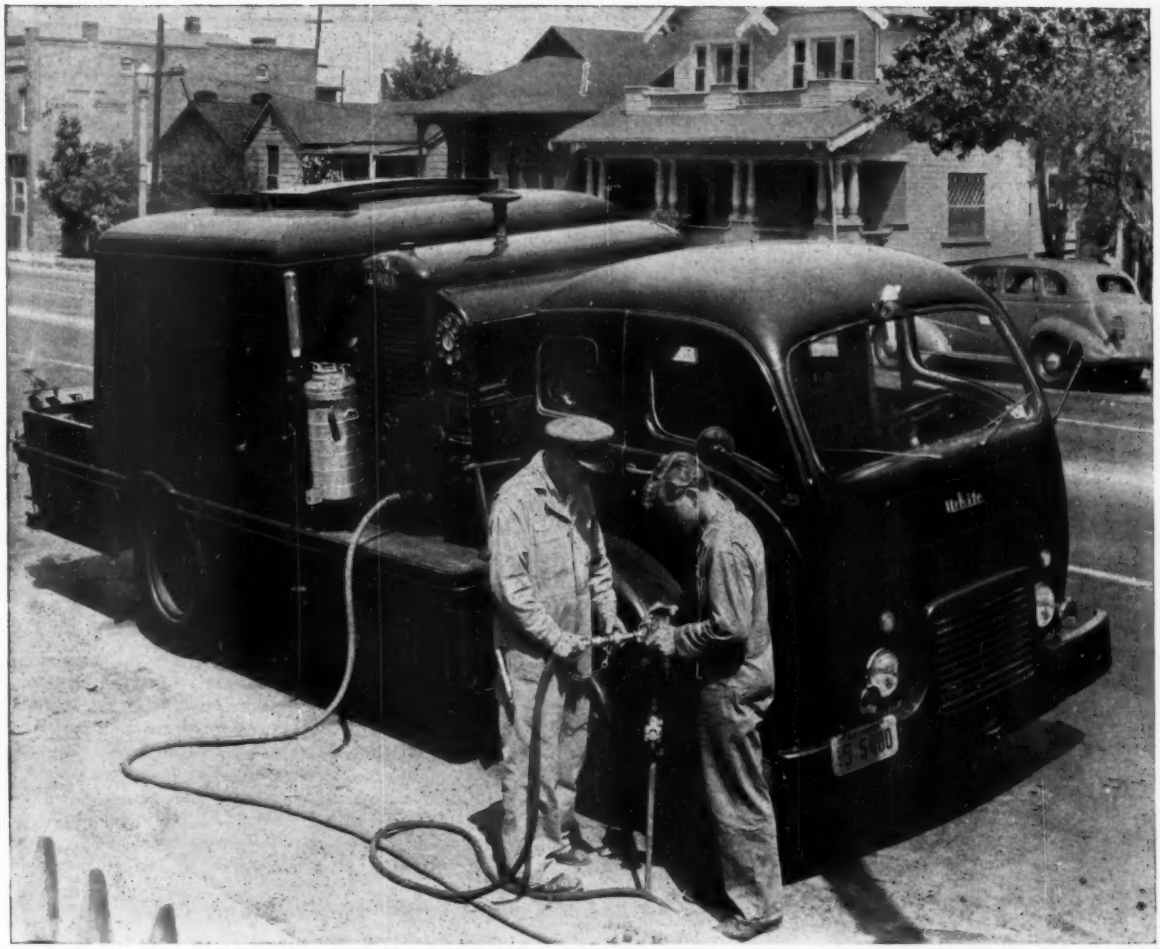
Equipment featured will include pipeline suspension bridges, trenchers, diggers, earth movers, cranes, compressors, backhoes, augers and pipe wrappers.

The largest array of New Freedom kitchens and laundries ever shown at an AGA convention will be presented Oct. 4-7 in the Conrad Hilton's Lower Exhibit Hall. Nine leading shelter magazines designed the displays featured in the 1959 "Parade of New Freedom Gas Kitchens and Laundries."

RCA-Whirlpool's "Mrs. America" kitchen also will be shown in the New Freedom exhibit, demonstrated by Mrs. Margaret Priebe, recently elected "Mrs. America" for 1960.

Another exhibit slated for the Chicago convention will show how AGA's PAR Program is opening new horizons for gas through research. The display includes such prototype devices as a model all-gas warm air gas furnace which employs thermoelectricity in generating power for its own circulating fan.

Eskil I. Bjork and J. J. Hedrick serve as co-chairman of AGA's 41st convention. Bjork is chairman and chief executive officer of The Peoples Gas Light and Coke Co., Chicago, and Hedrick is president. ■



Can you tell how old this truck is?

This is a 1950 WHITE 3000 series truck. Looks like many *new* trucks you see every day, doesn't it?

Outwardly, the famous WHITE 3000 series has changed very little in ten years. It is still strikingly modern in appearance . . . an asset to any company concerned with its public image.

Underneath, where it really counts, there has been constant change . . . the latest in improved operating efficiency and economy . . . the newest in top-performing, heavy-duty components.

See the WHITE 3000 series today—favorite of Public Utilities everywhere. Check *all* the advantages.

THE WHITE MOTOR COMPANY, CLEVELAND 1, OHIO

Branches, distributors and dealers in all principal cities

White gives you a competitive edge in Utility trucks because:

Longer Life—Powerful, heavy-duty construction stands up under the toughest jobs. Advanced styling keeps your WHITE new, year after year.

Lower Cost Operation—Top mileage from famous MUSTANG engine. Quicker, easier maintenance with power-tilt cab.

Better Maneuverability—Shorter wheelbase and shorter turning radius make the 3000 America's most agile truck!

Custom-Engineering—Your WHITE is built exactly for the job you want it to do.

WORLD LEADER IN HEAVY DUTY TRUCKS

WHITE

There is a Dresser®

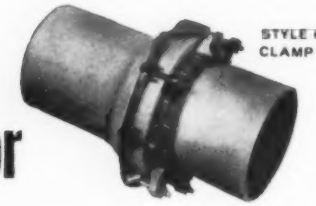
STYLE 38
6-BOLT COUPLING

pipe coupling,

fitting,

STYLE 90
STREET
TEE

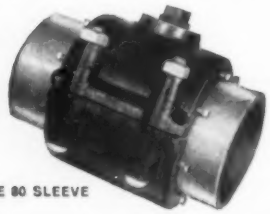
repair clamp,



STYLE 60
CLAMP

or

repair sleeve



STYLE 80 SLEEVE

for every need

Only Dresser
manufactures a complete line.

DRESSER
MANUFACTURING DIVISION
Bradford, Pennsylvania

GAS · DISTRIBUTION NEWS

Gas consumers to hit 43.7 million by 1970

GAMA's annual edition of "Natural Gas Construction Data" reports that 31,792,000 customers were receiving natural gas on Jan. 1, 1959. This number will grow to 43.7 million by 1970. Plans are being made to extend service to about a million families a year during the next decade.

During 1958, the FPC okayed pipeline and compressor construction projects totaling $622,306,000. These will supply new or added gas service to homes in 139 cities and hundreds of smaller communities throughout the country. At year's end the FPC had on file additional applications from companies wanting to spend $1,537,949,000.

During the first four months of 1959, the FPC authorized major projects totaling $208,397,000. It received new applications for major projects totaling $291,175,000.

GAMA points out that as of Jan. 1, 1959, 60 per cent of the pipelines and 62 per cent of the compressors authorized in 1958 had been completed and placed in operation. During the first four months of the year, major projects totaling an additional $6,159,000 were completed.

At the beginning of 1959, the nation's pipeline network extended 571,500 miles, equal to circling the earth 22 times. Of this total, 165,360 miles are used for transmission, 354,130 for distribution, and the remaining 521,010 as field and gathering lines.

If FPC approves all projects pending on Jan. 1, they will add 11,419 miles of pipeline and 962,894 hp in compression. By 1960, it is believed, the nationwide pipeline network will total 601,300 miles. By 1970 it will reach 858,300 miles.

In the past seven years, the gas industry's pipeline and plant investment has doubled, growing to an estimated $21 billion at the start of 1959. New construction is expected to continue at the rate of $2 billion annually for the next five years.

Gas appliance, piping standard revised by NFPA

A new standard for installation of gas appliances and piping has been published by the National Fire Protection Association.

The Standard, NFPA 54, has been completely revised, expanded and illustrated to present recent requirements for installing domestic and commercial gas-burning equipment. It covers such subjects as venting, clearances, air for combustion and ventilation.

Among the significant changes in the standard is inclusion for the first time of undiluted L.P. gas appliances and piping.

Copies of the pamphlet (NFPA 54, 110 pages, 50 cents per copy), are available from the NFPA, 60 Batterymarch St., Boston 10.

William M. Harcum (right), general manager of Robertshaw-Fulton Controls Co.'s eastern research center receives keys to the center's modernistic new building. Presenting them is L. B. Evans, representing the designer and builder. The new building in King of Prussia (Philadelphia suburb), is designed to house a staff of 100, is completely equipped for research and development work and performance testing.

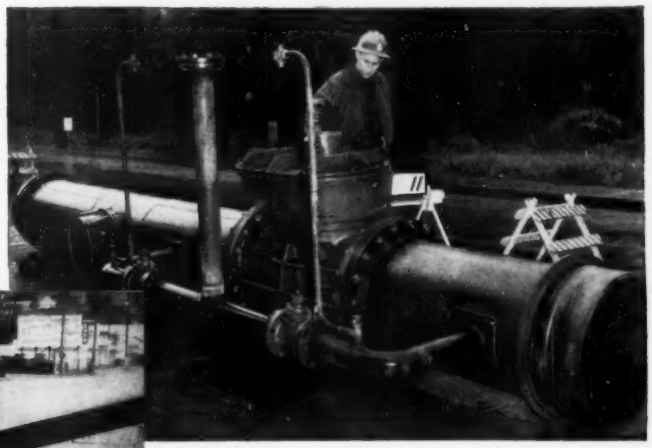
3-STEP VALVE INSTALLATION

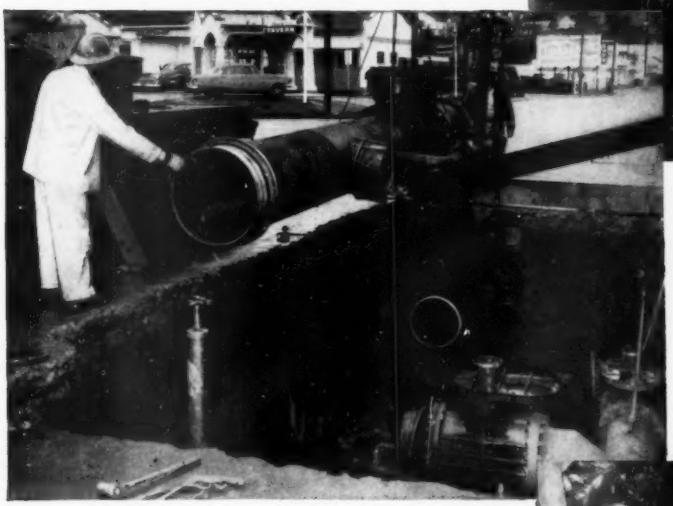
It's Fast and Easy with Dresser® Couplings

TIME is an important factor when a major feeder line shutdown is involved. Northwest Natural Gas Company of Portland, Oregon has developed a 3-step valve installation procedure that saves considerable time and vastly simplifies the whole operation. The sequence of illustrations shows how it is done.

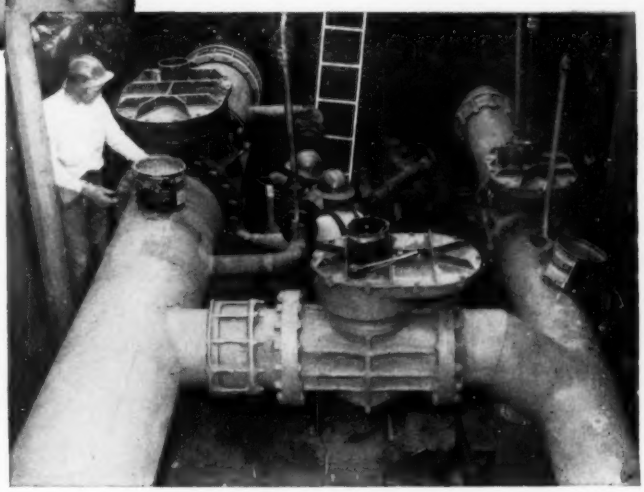
Dresser Couplings eliminate time-consuming, exact pipe fitting since they accommodate minor misalignments and still make positive, gas-tight joints. The time required for installation is essentially the two-man-minutes per bolt that it takes to make each Dresser Coupling a permanent, vibration-proof joint. And Dresser-Coupled joints will easily last the life of the line.

1. PREFABRICATION of the valve assembly speeds and simplifies installation, cuts shutdown time, and provides ample opportunity for joining and testing the joints of pipes with differing diameters or of differing materials *without the* excessive shutdown time required if this were done in the trench.





2. POSITIONING and lowering into the trench takes little time. The prefabricated valve assembly is complete with Dresser Couplings. Minor misalignments are readily accommodated; these flexible joints provide ample play for inexact pipe lengths or subsequent strains caused by ground settlement or vibration.



3. BOLTING UP the Dresser Couplings completes the installation. There has been a minimum of shutdown of the major lines; the installation has been fast, simple, economical . . . and most important, it is *permanent.*

DRESSER MANUFACTURING DIVISION

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ELIMINATE
MAJOR REPAIRS
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WELDED
STEELCASE METERS

- Tinned Steelcase Accuracy
- Hardcase Durability
- Maintenance Economies

American Welded Steelcase Meters provide a new approach to the economics of meter maintenance and retirement. Major repairs are eliminated. Minor adjustments are easy to make – assuring long service life at lowest maintenance costs.

Ask your American Meter representative for full details about Welded Steelcase Meters and their many advantages for all fuel gas services.

W-75	Rated cap. 75cfh – FOB Philadelphia
W-175	Rated cap. 175cfh – FOB Fullerton, Cal.
W-210	Rated cap. 210cfh – FOB Philadelphia
W-250	Rated cap. 250cfh – FOB Philadelphia
W-300	Rated cap. 300cfh – FOB Philadelphia
W-45-LPG	Rated cap. 45cfh* – FOB Philadelphia
WC-45-LPG	Rated cap. 45cfh* – FOB Philadelphia

*propane

Rated capacities at ½-inch w.c. differential with 0.64 sp. gr. gas – 5 psi working pressure.

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Appliance makers up sales predictions

The substantial sales gains recorded by the gas appliance industry in the first six months of 1959 are expected to continue through the balance of this year—and all of 1960.

Encouraged manufacturers predict that 1959 unit sales will exceed those of 1958 by 10 per cent. In 1960, unit sales will be another 3.8 per cent above this year's.

The mid-year survey was conducted by Edward R. Martin, director of marketing and statistics for GAMA. Results are included in Martin's semi-annual "General Business Outlook" report.

"This far is 1959," Martin observes, "the sales of practically all types of gas appliances and equipment have exceeded the expectations indicated in the December 1958 study.

"The second half's rate of increase over the comparable 1958 period, however, is expected to be somewhat lower than the percentage of increase reported in the first half. Even so, the year's total sales of built-in gas ranges, automatic gas water heaters, gas warm-air furnaces, gas boilers, and gas vented recessed wall heaters may reach new all-time peaks."

In the December survey, range makers felt that 1959 sales would reach 1,883,100 units. Now, with a relatively active first half a matter of record, the consensus is that this year's gas range sales will reach 2,054,700 units. The trend will continue through 1960, with sales reaching 2,155,600 units, they believe.

If all manufacturers produce and sell what they individually anticipate, Martin said, an even more optimistic prediction will be in order. The industry's 1960 total may go up to 2,276,700 ranges.

Built-ins, selling 231,700 units last year, are expected to increase to 340,000 units this year, to 399,400 units next. If all companies produce the number they expect to, 1960's total could reach 421,800.

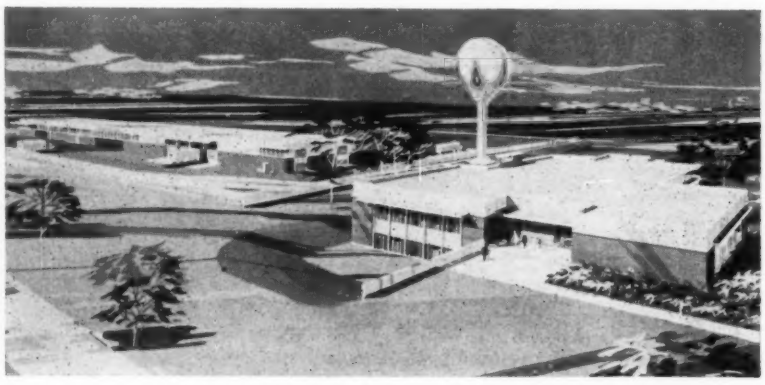
Automatic gas water heater makers predict 1959 sales at a record level of 3,030,700 units. An even higher peak—3,076,000—is anticipated for 1960. On the basis of individual company expectations, 1960 sales could go as high as 3,455,000 units, GAMA says.

Sales of gas central heating equipment (including warm air furnaces, boilers and conversion burners) are expected to hit a new peak of 1,317,600 units. In 1960, they are expected to hit 1,375,100. Sales in 1960 could reach 1,482,300 units, if all manufacturers perform as expected.

Sales of warm air furnaces will probably go over the 1 million unit mark for the first time this year. Next year, they will go even higher. Gas boiler sales, too, will reach a new high in 1959, and again in 1960.

Gas vented recessed wall heaters sales will top previous years with an all-time high of 427,300 units in 1959, increasing to 440,800 in 1960.

Northern Illinois Gas Co.'s new eastern division headquarters at Glenwood, Ill. is scheduled to be completed by December 1960. The $400,000 job consists of a T-shaped office building (at right in photo) housing division executive offices, customers service, sales construction, maintenance, and industrial relations departments in addition to lunchroom and meeting room. The 22,000-sq ft service building (left in photo) will contain transportation maintenance facilities, storeroom and shops. Modern techniques will streamline service operations.



GEM price tags help sell appliances on the display floor.

See Playhouse 90 on CBS-TV.

GEM CATCHES THEM ALL AT HOME

where they're most receptive to home improvement ideas.

GEM national magazine advertising bats 1.000 — selling millions of homeowners on the comforts and convenience of GAS for the 7 big household services.

Advertisements in the Saturday Evening Post, Better Homes & Gardens, New Homes Guide and Home Modernizing sell gas, gas appliances and gas equipment. They help insure the future growth of the Gas Industry.

Gas utilities gain added impact from these advertisements by publishing free GEM ad mats in local newspapers. Others use free reprints to dramatize the advantages of gas service.

GAS EQUIPMENT MANUFACTURER'S GROUP — GEM — MEMBER

These 15 suppliers to the Gas Industry are contributing to a brighter future for themselves and for their customers:

American Cast Iron Pipe Co.
American Meter Co.
Cleveland Trencher Co.
Fisher Governor Co.
E. F. Griffiths Co.
Koppers Co. Inc.
Mueller Co.
Pipe Line Service Co.
Rockwell Manufacturing Co.
M. B. Skinner Co.
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Superior Meter Co.
Subsidiary of Neptune Meter Co.
The Tapecoat Co.
U. S. Pipe and Foundry Co.
Vulcan Rubber Products
Division of Reeves Brothers, Inc.

All suppliers are invited to join the GEM program. To participate, ask any GEM sponsor or write Gas Equipment Manufacturers Group, Room 2925, 60 East 42 Street, New York 17, N. Y., for information about contributing to Gas Industry progress.

Published as a service to the Gas Industry by

AMERICAN® METER COMPANY
INCORPORATED (ESTABLISHED 1836)

Suppliers to the Gas Industry for:
Ironcase, Tinned Steelcase, Aluminumcase and Welded Steelcase Meters
American-Westcott Orifice Meters • Instruments • Reliance Regulators
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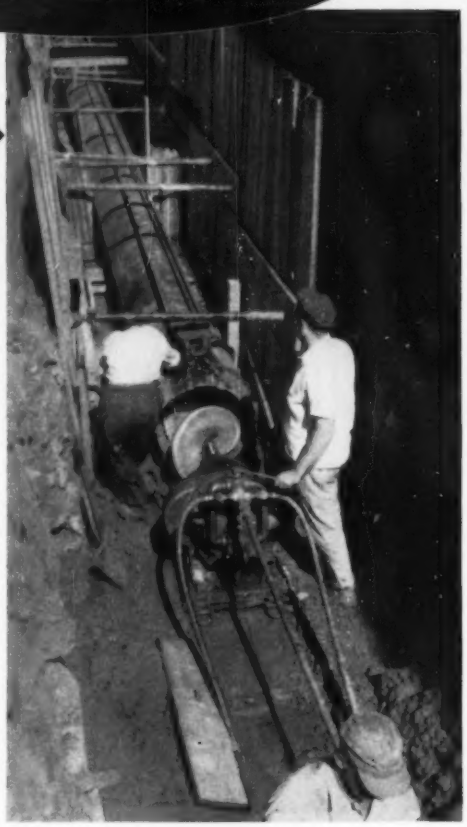
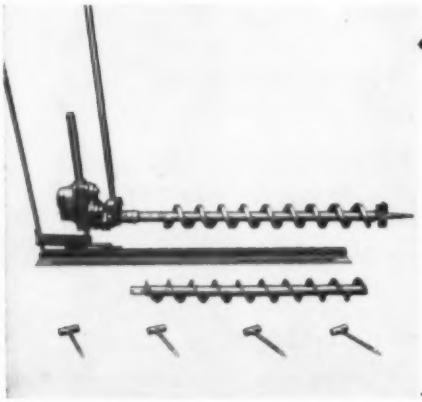
Drilling with KA-MO...



24-in. x 106-ft. bore *in only 4 hours!*

To install a gas distribution line under a railroad bed, this Ka-Mo 24" diameter horizontal drill bored a hole 106' long through hard compacted clay and ballast. Actual drilling time *took only 4 hours!* Drill was powered by an 18 h.p. air motor and installed casing as it made the bore. This fast, safe method of drilling and casing installation protects railroads, highways, etc., against costly cave-ins.

Next time you have a drilling problem, check the big Ka-Mo line. Drill sizes 2" to 48" dia. and larger . . . in sectionalized lengths . . . air, electric, hydraulic, gasoline, or diesel powered . . . tailored to meet your own particular requirements. Information is available at no obligation. Just call us, or mail coupon today.



Speeds installation of gas distribution lines

Here's a "close-up" of a 6" dia. horizontal drill with 6 h.p. vane type air motor and single-track mounting. It's light, portable, easy operating. Speeds installation of distribution and service lines under walks, streets, railroad beds, etc. Other sizes in this series: 3" to 14" dia. in sectionalized lengths with single or double-track mounting.

Mail to: KWIK-MIX CO., KA-MO Tools Dept., 1845 South 55th Ave., Cicero 50, Illinois

NAME .....
TITLE .....
COMPANY .....
STREET .....
CITY .....
STATE .....

Send free data on:
☐ horizontal ☐ vertical
☐ angular drilling equipment
Dia. of hole ..... in.
Length of bore ..... ft.
Type soil .....

KAM907 GAS

KA MO KWIK-MIX COMPANY — Ka-Mo Tools Dept.
A DIVISION OF KOEHRING COMPANY

Tell true gas story, Canadians urged

N. E. Tanner, president of the Canadian Gas Association expects stiff competition from electrical and oil interests. To combat this, Tanner calls for intensified advertising campaigns and selling methods to present the true story of natural gas to the Canadian public.

"The gas industry has gone through the exciting and hectic stage of laying a solid foundation as a major Canadian industry," he said. "The thing to remember," Tanner stressed, "is that a foundation is nothing more than a beginning if the gas industry is to maintain its rapid rate of growth."

Northwest island gets natural gas service

Mercer Island—located in Lake Washington — has become one of the nation's few islands served by natural gas. Charles M. Sturkey, president of Washington Natural Gas Co., Seattle, and Mercer Island civic leaders participated at the turn-on ceremony at the Island gate valve.

Completed at a cost of $400,000, the new gas service will serve 3000 to 4000 commercial and residential customers. Gas customers have been using propane gas, awaiting the East Channel underwater pipeline crossing bringing natural gas to the island.

Sturkey said his company's $7.5 million 1959 construction program added 4964 customers in the first six months of this year.

Changeover to natural gas in the Kenmore-Inglewood areas is completed. This $325,000 investment included a lateral to Bothell scheduled for early fall completion.

A $42,000 North-Central Tacoma supply line to meet increased demands for gas was slated for September completion.

Robertshaw in Italy

A newly formed subsidiary of Robertshaw-Fulton Controls Co. will build a plant for the manufacture of automatic control devices near Turin (Torino), Italy.

Robertshaw-Italia S.p.A. is owned jointly by Robertshaw and Societa Italiana per il Gas. The Italian company serves gas to most of Italy —both manufactured and natural gas, and bottled gas.

The new plant will make automatic thermostatic control devices for the growing European market.

New builder promotion launched by AGA

Gaining a larger share of the new home market for gas is the aim of a national program launched by American Gas Association.

The new Blue Star home program is the first builder program specifically designed by builders and utilities to offer prospective home buyers a guide to modernity and comfortable family living. Sponsor is the Gas Home Bureau of the AGA.

While national in scope, the program is designed to supplement existing local builder programs and provide minimum standards for areas wishing to set up a builder program.

To tie-in with the Blue Star Home promotion, builders and utilities must comply with minimum requirements of the program. But, they can upgrade these requirements in any way they choose.

Minimum requirements for tract homes call for inclusion of AGA approved gas appliances for cooking, water heating and house heating, and provision for gas refrigeration, incineration, laundering, and air conditioning where possible. All gas appliances used in Blue Star homes must meet standards set forth by the gas home committee. For example, gas water heaters must be able to deliver 81 gal. of hot water through a 100 deg F rise in the first two hours of use with minimum storage capacity of 30 gal. In addition, the builder must meet functional design requirements providing for modern, comfortable living.

In model and display homes, the builder must agree to display as many gas appliances as possible. He must also finish and accessorize the kitchen and utility rooms, maintain and man the house properly, and keep it open to the public for a reasonable period of time.

Enthusiastic support of the program is already indicated with close to 50 gas companies planning active participation.

One utility, Arkansas - Western Gas Co., has already signed up 52 builders in its area to build Blue Star homes in 1959 and 1960.

New distributor named

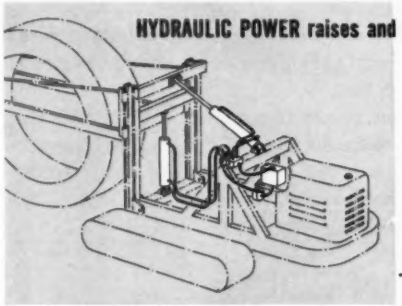
Wright-Thomas Equipment Co., Charleston, W. Va., is a new crane-excavator distributor for Bucyrus-Erie Co.

The company covers all of West Virginia except Hancock, Brooke, Ohio, and Marshall counties.

Operating on a limited budget?

Then check what this economy-size Parsons® 130 can do for you...

Here's a good, small, wheel-type ditcher in the popular low-price range that's big enough for main line trenching . . . yet, economical on extensions, service lines and other utility jobs. You get 12 inches to 18 lineal feet of trench per minute . . . 12 to 24 inches wide . . . at depths to 5¾ feet. Low in price, big in capacity, this Parsons 130 is built to the same heavy-duty high-quality standards of larger Parsons wheel Trenchliners. It has hydraulic wheel-hoist on power-tilt mast. Shiftable, reversible belt conveyor gives controlled discharge (hydraulic conveyor drive optional). To handle a wide range of soil conditions, heavy-duty digging wheel is equipped with cast-steel buckets with self-sharpening, reversible "Tap-In" teeth, quick-change gumbo buckets, retractable bucket-cleaner. Low-cost 130 also has 12-in. integral pad and rail-type crawlers. Tractor-type crawlers optional with 12-in. flat or 16-in. grouser shoes. See Parsons distributor — soon! 4 larger wheel-type, 5 ladder-type Trenchliners also available for any size trench from 6 inches to 6 feet wide, up to 19 feet deep.



HYDRAULIC POWER raises and lowers the wheel... and tilts the mast

Specified grades are easy to maintain with Parsons 130. Hydraulic ram on vertical mast raises and lowers the digging wheel — gives fractional-inch depth adjustment, maintains close grade tolerance. A separate hydraulic ram tilts mast, balances weight of wheel forward for traveling or trailer-loading. Overall width is only 8 feet (with conveyor intact) — no dismantling for transport.

Mail to: PARSONS Company, Newton, Iowa

Send us: ☐ latest literature ☐ price information on 130 Trenchliner®

NAME ..... TITLE .....

COMPANY ..... DIV. .....

STREET .....

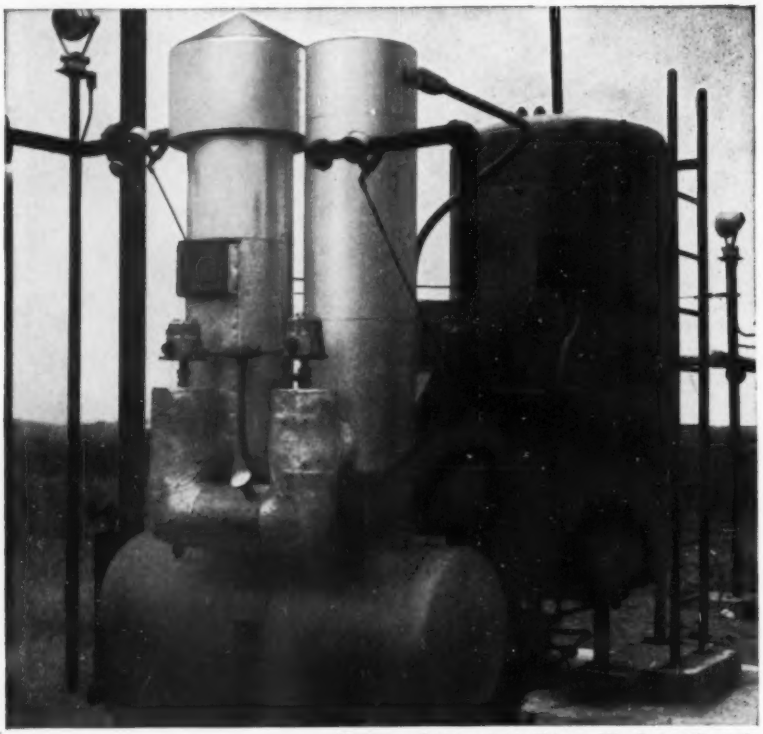
CITY ..... STATE .....

P922 GAS

PARSONS TRENCHLINERS

A Division of Koehring Company

FOG TO PROTECT GAS DISTRIBUTION SYSTEMS



The Koppers-Baltimore electric Oil Fogger, 100 gallon capacity, newly installed at the East Rutherford Natural Gas Metering and Regulating station—the Public Service Electric and Gas Company, Newark, N. J.

FOG TO REDUCE "UNACCOUNTED FOR"

By introducing a fine oil mist into gas mains, Koppers Oil Foggers reduce maintenance of meters and regulators; safeguard main joints; reduce leakage; solve dust problems; reduce service calls.

A single unit can service several gas distribution pressure systems. Koppers Oil Foggers are easily maintained, safe and are built to last.

Koppers has been producing equipment for the gas industry for more than 80 years. To find out how you can benefit from this broad experience . . . write today to: KOPPERS COMPANY, INC., Gas Apparatus Dept., 2010 Scott Street, Baltimore 3, Maryland.

FOG TO CONTROL DUST PROBLEMS

KOPPERS

GAS APPARATUS

Designers and builders of Gas Holders

Inspection, repair and service of Gas Holders

Operation Snowflake goes into sixth year

For the sixth consecutive year, U. S. Steel's Operation Snowflake will promote major appliances as Christmas gifts. The promotion gets under way Nov. 16.

Operation Snowflake unites efforts of manufacturers, distributors, retailers, trade associations, utilities and financial institutions. It is designed to win a share of the year's biggest spending season for ranges, refrigerators, freezers, washers, dryers, dish washers, water heaters and kitchen cabinets.

This year's operation is coordinated with the major fall promotion of the American Gas Association.

Gas and aluminum choice of Pittsburgh builders

Three Pittsburgh builders have selected gas as the fuel and aluminum as the building material for convenience and savings in their building plans. The three modern homes were opened to the public in August.

The "All-Gas House of Savings" are equipped with built-in gas ranges, family-rated gas water heaters, and modern gas heating plants.

Peoples Natural Gas Co. estimates that buyers can save at least $7000 during the life of a 20-year mortgage by using gas for cooking, water heating, clothes drying and heating compared to electric costs.

In addition to the tremendous savings realized by using gas, Reynolds Aluminum Co. estimates that by using aluminum, home owners can save an additional $6000 in maintenance and repair costs over a 30-year period.

As an added touch of elegance, each of the homes has a gas light illuminating the lawn with a soft warm glow.

New company formed

Edward Egloff and Robert E. Graper have formed Egloff & Graper Inc. in Los Angeles to represent two manufacturers. Both men formerly were with Natural Gas Equipment Inc.

They now represent the Lanly Co., Cleveland, producer of ovens and dryers for heat processing; and Electro-Alloys Division of American Brake Shoe Co., Elyria, Ohio, producer of heat and corrosion resisting alloys.

Egloff & Graper also will design and build heat treat equipment.

Gaffers & Sattler officially opened its new World Headquarters Building in Los Angeles last month. The $500,000 structure features glare-proof windows, air conditioning, a tile-decorated elevator system, soundproofing, piped music, and a modern exhibit area for dealers.

Gaffers & Sattler moves into new headquarters

Two modern communications systems, and a host of new design features highlight Gaffers & Sattler's new headquarters building opened last month in Los Angeles. All executive and sales personnel of Utility Appliance Corp. and its Gaffers & Sattler product divisions are housed in the new building.

Equipment includes the Friden calculator, electronic equipment to process sales orders. The calculator instantaneously transmits sales order information to the company's Vernon and Hawthorne accounting and shipping departments. It can transmit over 400 orders a day.

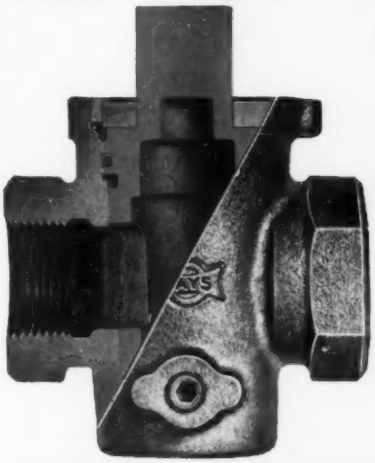
With the new two-way radio contact system, the service manager is in constant contact with service trucks throughout the area.

Testing agreement signed by Canadian groups

Canadian Gas Association and the Ontario Research Foundation have extended their agreement for testing gas-fired equipment. A new five-year contract was signed.

Previous testing agreements were verbal. Now, because of the rapid expansion of the gas industry and the increasing use of gas-fired equipment, it was felt a firm policy stand should be made establishing the foundation as the association's testing agent for the province of Ontario.

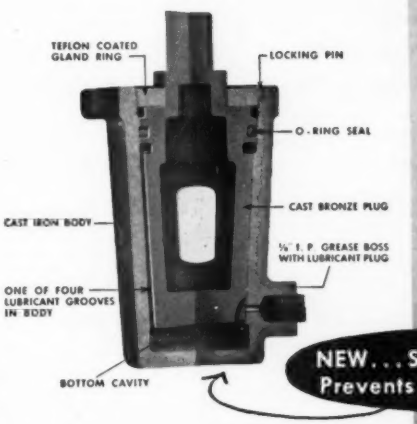
THIS GAS STOP WILL *NOT STICK...*



- A newly designed HAYS Lubricated and Tamper-Proof Gas Stop . . .
- Stop is completely lubricated at the factory . . .
- Four Grooves in body, and Lubricant Plug provide for pressure re-lubrication . . .
- Locking Pin positively prevents tampering at top of stop . . .
- O-Ring prevents top leakage . . .
- Teflon Coated Gland Ring reduces friction between top of plug and gland ring...

Re-Lubrication does the *TRICK*

HAYS LUBRICATED TAMPER-PROOF SAFETY GAS STOP*



- Lower initial and turning torque . . .
- Extra grade gray iron body, gas service bronze plug . . .
- Individually tested . . .
- Black or Galvanized, Flat Head or Lockwing Pattern...
- Sizes: ¾", 1", 1¼", 1½", 2", for 125 psi. W. P.

Write for Folder 121 and prices.

*Patent applied for.

NEW... Solid Bottom Construction Prevents Leakage and Tampering

HAYS®

GAS SERVICE PRODUCTS

HAYS MANUFACTURING CO.

ERIE, PA.

THE *FINEST* FOR MODERN GAS DISTRIBUTION SERVICE

NORMAC

Insulating Couplings AND Fittings

Malleable Couplings

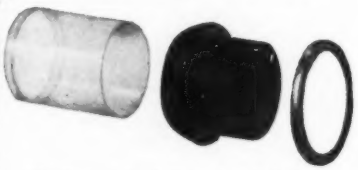
Normac Insulating Malleable Couplings and fittings are available with polyethylene inserts and semi-insulating gaskets or full insulating rubber gaskets.

Malleable Service Ell

The insulating principle depicted above is carried out in all Normac Ells and Tees.

NORTON McMURRAY has specialized for 20 years in the development and production of products solely for the Gas Industry. Whether your plans include modernization, or new, expanded facilities, Normac Gas Distribution Equipment will serve you well.

Insulating Gaskets



The Normac insulating principle incorporates an efficient combination of a polyethylene sleeve and a semi-insulating gasket or full rubber gasket and retainer ring.

Brass Fittings

Normac insulating Brass compression end Tees, Ells and all compression end fittings are available with polyethylene inserts and semi-insulating gaskets or full insulating rubber gaskets in ¾", 1" and 1¼" iron pipe sizes.

New CATALOG

Write for your copy . . . it gives complete details and specifications of NORMAC equipment.

NORTON-McMURRAY Manufacturing Co.

919 North Michigan Avenue
CHICAGO 11, ILLINOIS

Couplings • Meter Bars • Sleeves • Cocks • Ball Joint Clamps • Service Tees and Ells

Term-X Couplings

THE IDEAL EXTENSION FITTING FOR GAS DISTRIBUTION SYSTEMS

PIPE FABRICATING & SUPPLY CO.

9703 NORWALK BLVD.
SANTE FE SPRINGS,
CALIFORNIA
RAymond 3-9901

Shop Fabricated Piping for . . .

COMPRESSOR PLANTS
CHEMICAL PLANTS
REFINERIES
PUMP STATIONS
Etc.

Arizona PSCo. has new main extension policy

Arizona Public Service Co.'s new customer connection policy requires payment of a $5 service charge. Also in effect is the company's new policy on gas line extensions.

The $5 charge will be made for all new gas and electric connections and reconnections.

Gas line extension policy changes are as follows:

For customers with refrigerated gas air conditioning: 250 ft of main and 90 ft of service installed free.

For customers with three or more connected uses of natural gas (other than gas air conditioning), free extension of main will be made up to 150 ft, free extension of service up to 75 ft.

For customers with two uses of gas, free main extension of 75 ft and free service of 30 ft.

For customers with only one connected gas use, no free extension allowance will be made.

Superior combines plants

Superior Meter Co. Inc. has consolidated all of its operations in its main plant in Brooklyn, N. Y. The move includes both manufacturing and sales.

Involved was the transfer of manufacturing of hardcase gas meters from Superior's plant in Punxsutawney, Pa. to the Brooklyn plant, formerly devoted to tinned gas meters.

Standard for water heater tanks revised

New specifications for porcelain enameled tanks for use in domestic hot water systems are up for consideration. They are contained in a recommended Commercial Standard presented to the industry by the Commodity Standards Division of the U. S. Department of Commerce.

Copies of "Recommended Revision of Commercial Standard CS-115-44, Porcelain Enameled Tanks for Domestic Hot Water Service, TS-5452," are available from A. S. Best, Commodity Standards Division, Department of Commerce, Washington 25, D. C.

New division set up

An International Division has been set up by General Controls Co. to supervise and coordinate its expanding overseas activities.

The new division is headquartered in the company's head offices in Glendale, Calif.

GAS ASSOCIATIONS

Measurement Institute program set

Oct. 13-14 are the dates of the 7th annual Gas Measurement Institute held at the Southwest Kansas Center of the University of Kansas. The institute will be held at the National Guard Armory in Liberal.

Members of the gas measurement planning committee are Norman Watson, Panhandle Eastern Pipe Line Co.; Wilbur Miller, Hugoton Production Co.; Marcus Ford, Colorado Interstate Gas Co.; Ned Layton, Cities Service Gas Co.; and H. G. Woods, Northern Natural Gas Co.

First-day instructors and their subjects include: Arthur P. Gallagher, Burgess-Manning Co., Effect of Pulsation on Orifice Meter Measurement; Paul D. Maxwell, Sullivan-Mears Co., Regulators—Maintenance of High and Low Pressure; Howard Holmes, American Meter Co., Importance of Handling Calculating Orifice Meter Charts; D. C. Joyce, Bristol Co., Telemetering; and W. W. Shade, Rockwell Manufacturing Co., Maintenance of Positive Meters Stressing Irrigation Type.

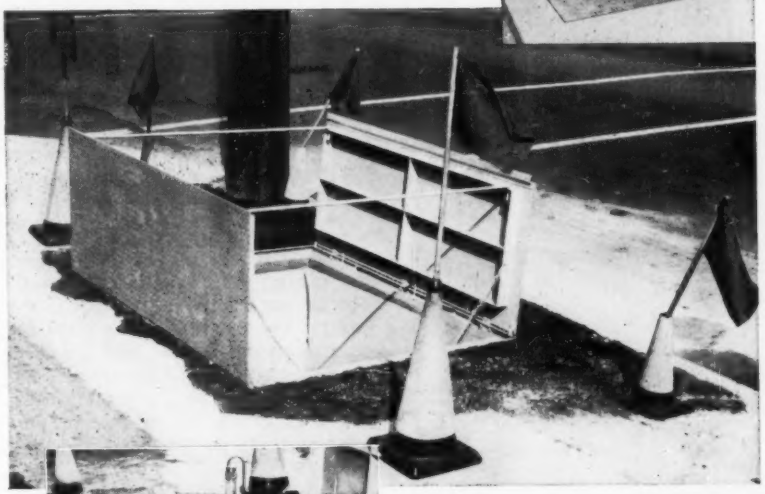
Second-day instructors and subjects: Darrell L. Harms, Northern Natural Gas Co., Installation and Maintenance of Bellows Type Meters; G. M. Kintz and Harold F. Browne, Bureau of Mines, Flame Propagation and Explosion-Proof Electrical Equipment; Neal Gardner, Colorado Interstate, Maintenance of Merk Orifice Meters; Norman Watson, Panhandle Eastern, Supercompressibility — Bean Type; Arthur Haas, Northern Natural, Operation and Maintenance of Calorimeters.

NARUC to meet

The 71st annual convention of the National Association of Railroad and Utilities Commissioners will be held Oct. 12-15 at the Bellevue-Stratford Hotel in Philadelphia.

Continued on page 136

easiest access to regulators under-the-sidewalk



SPRING-BALANCED BILCO DOORS ARE EASY-TO-OPEN AND COMPLETELY WEATHERTIGHT

Bilco vault doors are the safe choice for gas regulator vaults underfoot. More and more gas companies are finding that Bilco doors wear better, keep water out. When opened they provide maximum ventilation for service men's safety. Built-in drainage and easy maintenance add up to another Bilco bonus—and every Bilco door swings open easily because it's *spring-balanced!*

Send coupon today for FREE copy of article in Gas Magazine, entitled: "Standardization and Prefabrication of District Regulator Installations."

Bilco®

DOORS FOR SPECIAL SERVICES

The Bilco Company, Dept. A-1910
New Haven 5, Conn.

Send reprint of article in Gas Magazine ( )
Send catalog with details of Bilco sidewalk doors ( )

Name_____
Firm_____
Address_____
City_____ Zone___ State_____

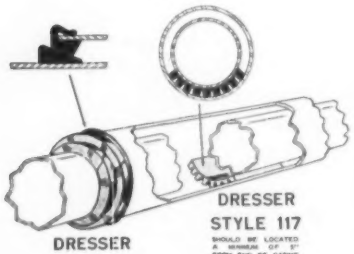
GAS DIGEST

New Products and Trade Literature

For more data on any of these items use the Readers' Service Card on pages 125, 126

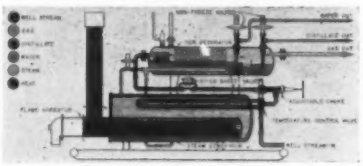
1. Gas line tester

New equipment for testing gas lines beneath streets and sidewalks is available from Equipment Corp. of America. Known as the ECOA spudding operation, the system consists of a propane-powered generator, spud hole drilling rig, Wetair Water Miser, and diamond core masonry bits. The diamond core bit cuts a clean, sharp hole of 1-in. diameter. It drills through 4-in. thick concrete sidewalks in seconds. It also quickly penetrates hard concrete, steel reinforcements, flint and granite aggregate, and similar street and roadway materials.
Equipment Corp. of America



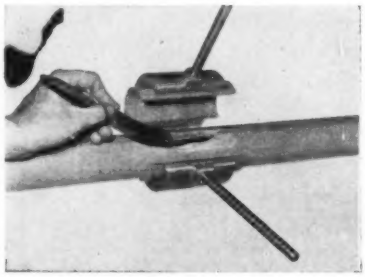
2. Casing seal and cradle

Dresser Manufacturing has a new casing insulating seal (Style 116) and a casing cradle (Style 117). The seal provides both effective sealing and insulation of casing ends. This dual role results from the design of the double gasket. The casing cradle is also multipurpose. Not only does it provide permanent insulation and support between carrier pipe and casing at the casing end. It also centers carrier pipe in the casing to help insulating seal do a more effective job.
Dresser Manufacturing Div.



3. Separation system

National's steam generating "Production Pak" is a pre-piped skid-mounted, three-phase separation system with a steam generator. It is designed to produce wells that require pre-heat before choking down to separator pressures. Automatic controls and valves maintain absolute control over water bath temperatures and sales gas leaving separator.
National Tank Co.



4. Plastic pipe repairs

A fast, easy method for in-the-field repairs of PVC plastic pipe is available. With Kraloy's new "solvent-weld repair clamp," one man can quickly repair a pipe break, injury or mechanical damage on the spot. "Hot" repairs on intermediate pressure gas lines are easily made. Plastic "half soles" are supplied in pairs for use in the clamp.
Kraloy Plastic Pipe Co.

5. Measuring wheel

Accurate and dependable measurements of irregular and uneven terrain are possible with a new measuring wheel. The precision-calibrated instrument can be operated by one man. It registers measurements to ½ in. on one side of the disc wheel and tenths of a foot on the other. One man can roll it along to measure up to 100,000 ft.
Rolatape Inc.

6. Tractor shovel

Allis-Chalmers is offering a new 1½-cu yd HD-65 tractor shovel. It is powered by a 4-cycle diesel engine rated at 72 net hp. Four for-

FOR MORE INFORMATION

about New Products in this Issue . . . . .

Each New Product or Trade Literature item reviewed in this issue is numbered. Circle the corresponding numbers on the Readers' Service Card; then PRINT your name, title, company and address plainly and drop the card in the mails (no postage is needed).

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COMPANY_____

ADDRESS_____

CITY & STATE_____

October, 1959 • Void after 90 days

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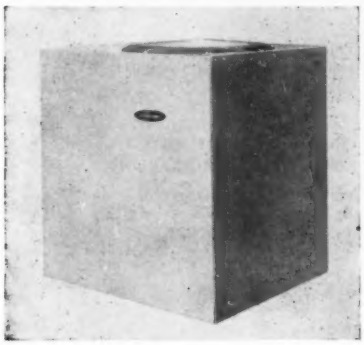
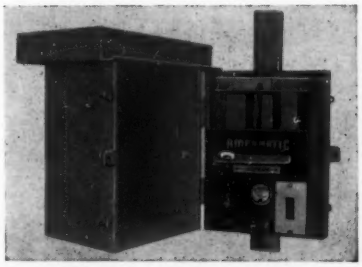
ward speeds from 1.5 to 5.5 mph and two reverse speeds of 2.0 and 4.1 mph may be selected with the single lever shift located within easy, natural reach of the operator.
Allis-Chalmers



7. Air conditioner

A new remote type gas-fired air conditioner, the Miracool, is an air cooled absorption refrigerated unit that supplies chilled water to the cooling coil. The Miracool can be adapted for use with companion upflow, downflow, or horizontal furnaces using matching coils. Or, it can supply cooling alone with a fan-coil blower unit.
Payne Co.

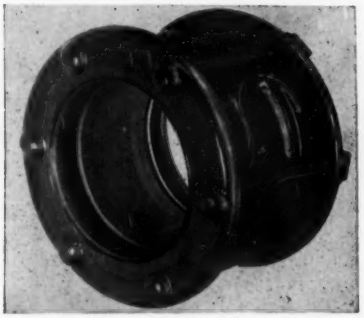


8. Cathodic protection

Good-All has a new self-adjusting cathodic protection rectifier. The Amp-O-Matic eliminates the need to adjust rectifier output when a gully washer or a dry spell changes ground bed resistance. It is simply set for the amperage needed to give corrosion protection and forgotten. Amp-O-Matic adjusts the output itself, compensating for changes in ground bed or stack resistance.
Good-All Electric Mfg. Co.

9. Pipe couplings

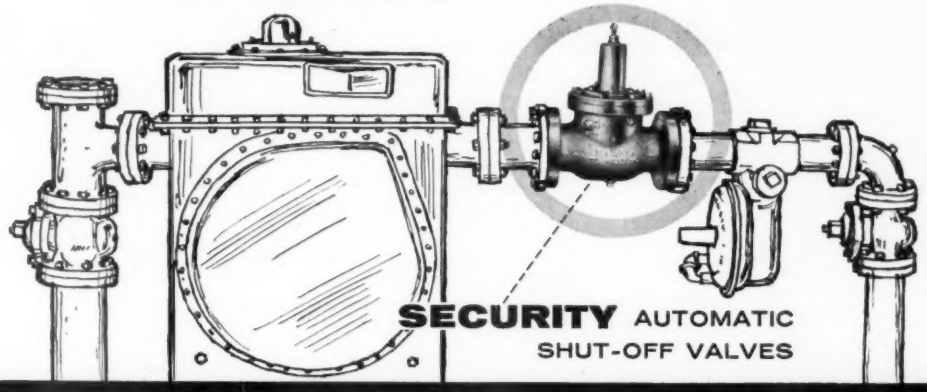
Dresser's new factory - coated, pre-assembled pipe couplings are said to be ideal for joining mill wrapped pipe. The Stab-Clad coupling (Style 123) has a factory applied permanent coating of coal tar epoxies and coal tar enamel. With the stab-type, electrically bonded coupling, it is necessary only to stab pipe ends into the preassembled coupling and tighten the bolts.
Dresser Manufacturing Div.



10. Rotary compressor

All quality features of larger Jaeger rotary compressors are offered in the new 85-ft model. It is powered with Continental F-162 engine developing 45 hp at sea level and equipped with a 12-v electric starter. Among standard equipment: hour meter, automatic blow-

THE SOLUTION TO YOUR OVER-PRESSURE PROTECTION . . .



SECURITY AUTOMATIC SHUT-OFF VALVES

A typical industrial installation

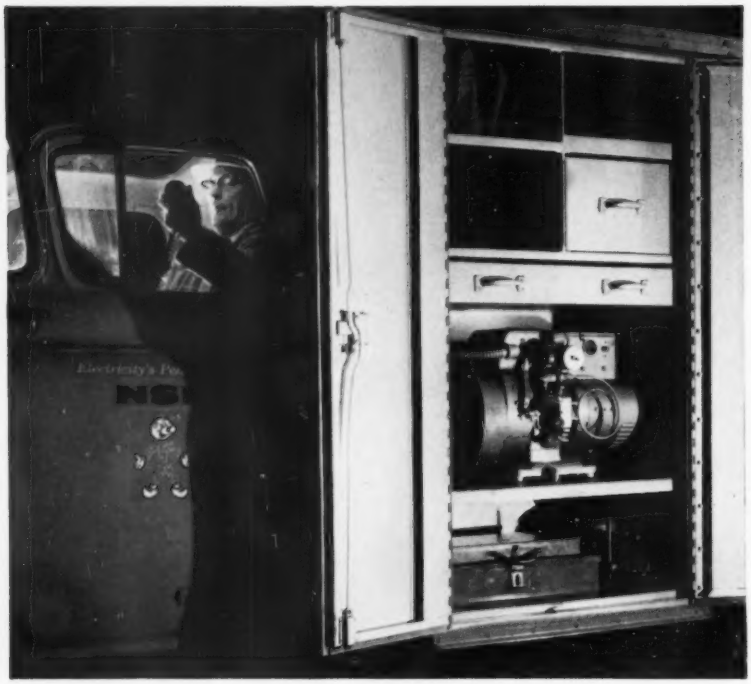
Model "IP-H" (closes on Increase of Pressure, High pressure application) shown above. POSITIVE, ECONOMICAL, EASY TO INSTALL. Write for catalog on complete line of Automatic Shut-off Valves.

SECURITY VALVE

SECURITY VALVE CORP.

909 EL CENTRO • SOUTH PASADENA, CALIFORNIA
MURRAY 2-3303

Onan NEWS REPORT



Built-in dual-purpose electric plant

delivers 2KW for tools and lights; keeps batteries fully charged, too!

Utility construction and maintenance trucks like this one, use two kinds of auxiliary electric power . . . and the Onan Electric Plant provides both. Workmen can plug in on the plant for 2,000 watts of 115-volt, 60-cycle A.C. to operate electric tools like drills, saws, soldering irons and floodlights. Or the plant will deliver 30 amperes of 12-volt D.C. to handle the battery drain of 2-way radio and battery-powered lights.

The Onan's D.C. output makes it unnecessary to run the truck engine to keep batteries charged, making savings in fuel and engine maintenance totaling hundreds of dollars per year per truck.

Leading body builders now install these dual-purpose Onan plants on new vehicles or you can mount them on vehicles now in service. Onan's Vacu-Flo cooling system permits installation within a closed compartment. Where no space is available in the truck body, the plant can be neatly installed over the cab within a handsome weatherproof steel housing.

Dual-purpose utility models are available with either 1,000 or 2,000 watts A.C. Powered by smooth-running single-cylinder Onan air-cooled gasoline engine.

ONAN INSTAPAC

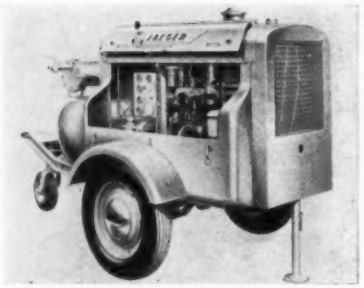
Instantaneous standby power for microwave systems. No interruption of any kind of signal. No moving parts. Can be fitted to existing standby installations.

Call the Onan distributor listed in your phone book or write for specifications.

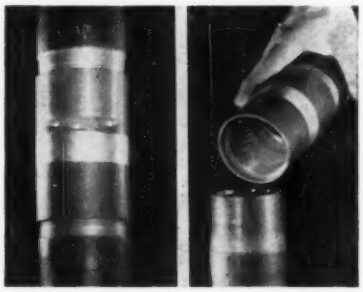
D. W. ONAN & SONS INC.

ELECTRIC PLANTS GENERATORS ENGINES ENGINE-COMPRESSORS
2865 University Avenue S. E. • Minneapolis 14, Minnesota

Onan ELECTRIC PLANTS



down valve, thermostatically actuated oil bypass valve.
Jaeger Machine Co.



11. "Slim-hole" tubing joint

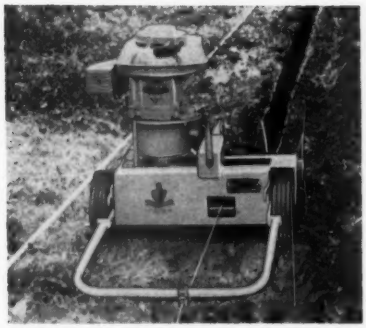
Jones & Laughlin's new "slim-hole" tubing joint is for multiple completion gas and oil wells. The new coupling for 2⅜-in. tubing is machined down to an OD of 2¾-in.
Jones & Laughlin Steel Corp.

12. Closed circuit TV

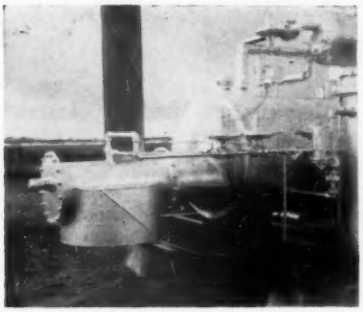
Motorola is introducing a line of five closed circuit television cameras and two monitors. The basic general purpose camera, available in four versions, provides 550-600 lines horizontal resolution. It weighs 12 lb and measures 5½x7x 11 in. It puts out a 1-v video signal into a 75-ohm coaxial cable.
Motorola Inc.

13. Self-propelled trencher

The new Davis Pup trencher is self-propelled so it can dig by itself while workmen are preparing the pipe for the trench. Propulsion is by means of a winching mechanism with a six-speed drive. The unit

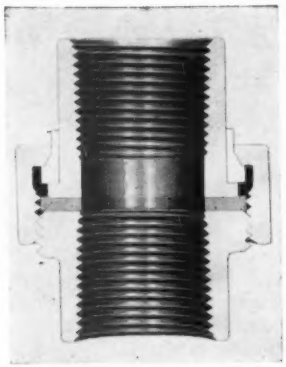


can be started, set at a desired depth, and be left unattended for the most part until it finishes the trench.
Davis Manufacturing Inc.



14. Flame arrestors

National flame arrestors are designed to stop all flame propagation outside of firetubes. The units are of welded, heavy steel construction. They will withstand any explosion inside the tube and prevent flash from going through the element. Two types are available. Both can be supplied with push-button pilot lighters or automatic robot pilot.
National Tank Co.



15. Insulating unions

Capitol has developed two types of insulating unions for gas distribution use. The special and high temperature unions are primarily for meter installations. They

Standard Pneumatractor is a self-propelled 125 cfm air compressor with tractor features. Here, Pneumafeed is used with the Pneumatractor for gas "barring" application.

SEE THE PNEUMATRACTOR AT THE A.G.A. CONVENTION

Drive your air compressor, don't push it!

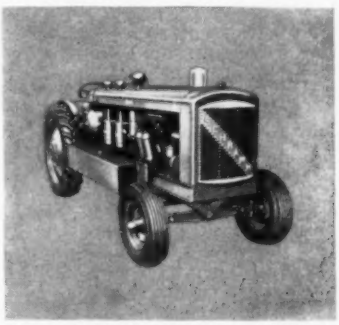
Here's the smart, money-saving way to use air compressors on any job . . . drive your air source to the job and along with the work. Saves valuable time, keeps manpower on the "paying" jobs.

Schramm Heavy Pneumatractor—self-propelled air compressor—saves you money other ways, too, because it's an all purpose machine . . . will never stand idle. You can operate standard pneumatic tools, such as paving breakers, rock drills, tampers . . . *and* also dig, backfill, load, grade—no end to the jobs you can do. Yet Pneumatractor still costs much less than the cost of a tractor, loader, backhoe *and* air compressor.

Yes, both the Schramm Standard Pneumatractor and the Heavy Pneumatractor will be demonstrated at the A. G. A. Convention. Be sure to see them both. If you can't make it, write for a free copy of Catalog 5740.

See the Yellow Pages for local Sales, Service and Rental of the complete line of Schramm Pneumatractors.

Heavy Pneumatractor is a self-propelled 125 cfm air compressor that also operates front end loader, backhoe, tilting angle blade, rotary sweeper, many other accessories.



Schramm 250 Pneumatractor gives a full 250 cfm of air at no greater cost than most ordinary 210 compressors—plus the added convenience of self-propulsion.

Schramm, Inc.
MANUFACTURERS OF AIR COMPRESSORS
741 North Garfield Ave. • West Chester, Pa.

NEW Lancaster VALVE COVER
eliminates practically all troubles from normal sticking and lifting valves . . .
* Sun-resistant ring Specially compounded of friction-free inert carbon-graphite
New Lancaster Valve Cover has the most level and truly concentric seat surface ever achieved. Special compound of carbon-graphite is strong, shock resistant and silent . . . ends valve squeaks and is far less apt to break or chip in transit, repair or installation.
Large ½-inch stud is made of long wearing nickle-silver. It's rounded and swaged into the rugged brass shell . . . allows continual, positive contact with any driving dog position.
* Large-Profile Stud offers greater contact area
New, Improved Lancaster Carrier Wire Assembly
keeps pans moving in straight line . . .
Side carrier bracket height adjustment assures most accurate positioning . . . oval slots in new center bracket allow straight through diaphragm travel. Center bracket available separately adapts to any carrier wire. Porous bronze graphite bearings throughout.
"a meter is only as accurate as its parts"
Lancaster METER PARTS CO.
Manufacturers of Quality Parts for Gas Meters
POST OFFICE BOX 370 LANCASTER, OHIO

1897 1959

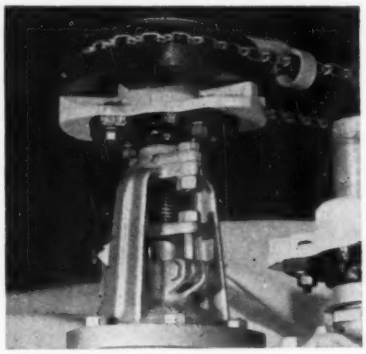
PIPE STOPPERS OF ALL KINDS

SAFETY GAS MAIN STOPPER CO. INC.

GOODMAN USED SINCE 1897 2" HANDLE & LOCKING SLEEVE GAS MAIN STOPPER

523 Atlantic Avenue
Brooklyn 17, N. Y.
Cable Address GASTOPPER, N. Y.

prevent corrosion caused by electrolysis and add years to service of both meters and piping. The high temperature insulating union is designed for maximum protection against a gas leak in the event of fire. It will withstand 450 deg F for one hour. Both unions come in sizes ranging from ¾ in. to 2 in.
Capitol Manufacturing Co.



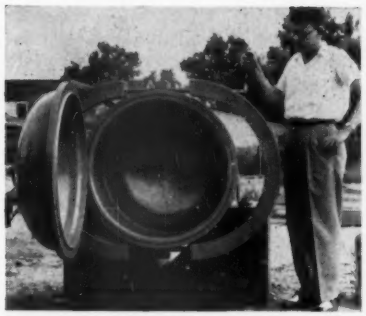
16. Unseating valves

Roto Hammer is a mechanical means for initial unseating and final seating action of a valve in any heat or pressure service. Hammer and anvil components transfer impact action to elevating mechanism which actuates the valve.
Roto Hammer Co.

---

17. Leak detection

The "Leak Seeker" is a means of building up and maintaining pressure in low and intermediate gas lines while testing for leaks on customers' premises. The new device, primarily a small electrically operated compressor, doesn't require the nearly-constant attention of an operator as when using manual methods. Provided are 10 ft of air hose to connect compressor to manometer or other gauge, and 50 ft of electrical cord for connection to any house circuit.
DeVilbiss Co.



18. Hinged closures

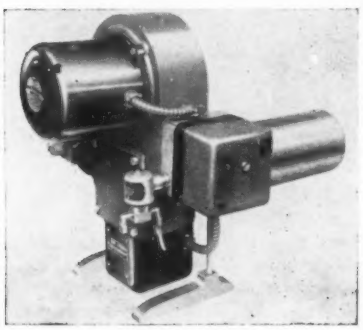
Tube Turns has added a line of one-man hinged closures with built-in safety features to its list of piping components. Simplicity of design, ease of installation, and weight saving are additional features. The closure is a complete assembly. Basically it consists of a hub installed with a single circumferential weld and a hinged cover or cap clamped within two yoke halves.

Tube Turns Division

19. Gas flow computer

An all-electric gas flow computer automatically and continuously measures mass flow of gas under standard conditions. The basic instrument consists of a differential pressure transmitter, an absolute temperature sensing device, an absolute pressure transmitter, an analog computing circuit, and an electronic circular or strip chart recorder. In addition to such functions as indication, recording, control and integration, the gas flow computer can be coupled to telemetering and remote control systems, supervisory control, data handling, and industrial process computers.

Minneapolis-Honeywell Regulator



20. Power gas burner

A new industrial burner is for conversion of commercial and industrial coal or oil furnaces and boilers to gas. Standard equipment

"3 Efficient, New RIDGID Accessories Save Me Time on Every Job!"

A RIDGID No. 310 Carriage—Slip this strong, lightweight aluminum alloy carriage on the support arms of your RIDGID 300 Power Drive, and you'll get real cut-and-thread efficiency! Holds die head and cutter at your fingertips exactly like a pipe machine. No fumbling for right size threader . . . no tools to drop. Easy sliding . . . snugs right up to chuck for close threading and cut-off.

B RIDGID Die Heads—The time-saving RIDGID 535 Quick-Opening Die Head shown here, or any other RIDGID Machine Pipe and Bolt Die Head, snap-locks into carriage quickly, easily . . . eliminates slow back-off. Single adjustment on carriage centers die head exactly for true threads every time.

C RIDGID No. 360 Cutter—Full-floating, wheel-type cutter . . . wide rolls for straight cuts at pipe machine speed. Attaches easily with swivel drive pin. Fits 310 carriage only.

Die head and cutter operate independently . . . swing up and stay out of way when not in use. Add a RIDGID No. 19 Nipple Chuck and you can even thread close nipples.

For a bargain in fast, easy work, equip your RIDGID 300 Power Drive with these accessories that are available individually . . . at your Supply House!

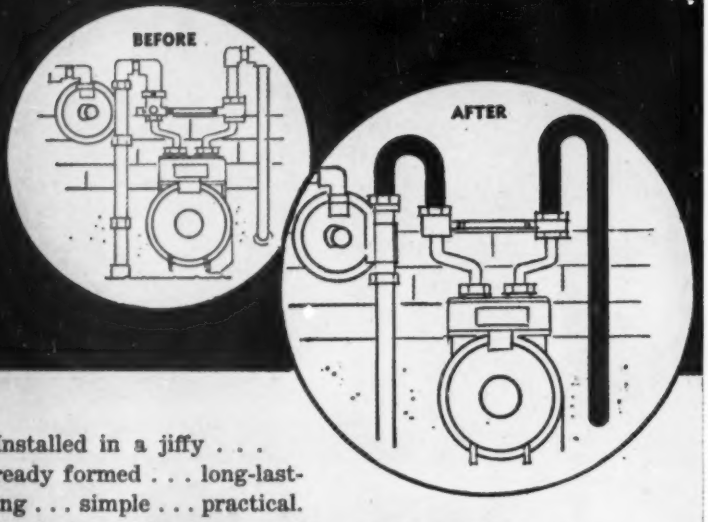
RIDGID

The Ridge Tool Company, Elyria, Ohio, U.S.A.

✓ BRING YOUR METER CONNECTIONS UP TO DATE

PRODUCTION METER LOOPS and RISERS

• Eliminates Fittings



Installed in a jiffy . . . ready formed . . . long-lasting . . . simple . . . practical. Production Meter Loops and Risers have everything! Graceful and ready for installation anywhere. Good for years . . . good for you and your users.

- 90° and 180° bends
- ¾" - 1" - 1¼" pipe
- threaded one or both ends
- special shapes, if desired

Write for details and prices or for representative to call.

Manifolds and Supply Pipes for Gas Appliances

THE PRODUCTION PLATING WORKS, Inc.

LEBANON, OHIO

MR. PRESIDENT...

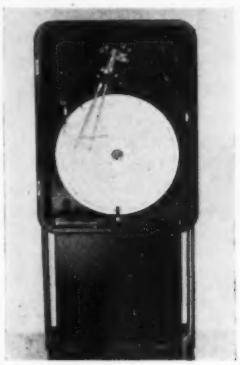
You've heard it said many times that "What the gas industry needs is a trade character" . . . a character who can help in the highly competitive battle for the consumer's fuel dollar. Speedy Therm is the only gas character who can't possibly be mistaken for a drop of water, oil, puffed rice or anything else, because he has G-A-S written all over his face. And Speedy brings you a monthly service featuring hundreds of drawings in a wide variety of poses. Hire Speedy Therm *now* to help your company in the battle of fuels.

For More Information, Write

SPEEDY THERM SERVICE COMPANY

16 BAYCREST DRIVE • ROCHESTER 22, NEW YORK

is Honeywell's electronic safety control. One air adjustment is featured, which automatically lets proper amount of primary and secondary air with one adjustment. Three models are available: 400,000, 700,000, and 1 million Btu per hr input.
Liberty Combustion Corp.



21. Chart changers

Daily or weekly chart readings change themselves on the exact hour through a chart-recording program with the new Dial-O-Graph automatic chart changer. It can be added to present chart drives with simple modification. Each revolution of the chart actuates a release mechanism that drops the chart in the Dial-O-Graph magazine where they are stored in chronological order until collected.
Mullins Manufacturing Co.

22. Horizontal auger

Compton's new horizontal auger can bore through solid rock formations and install pipe up to 48-in. diameter as it bores. The machine is powered by a 73-hp engine with direct gear drive and hydraulic feed. The photo shows the machine cutting a 30-in. hole and installing steel pipe through 57 ft of solid rock beneath a highway. The job was completed in less than 8 hr.
Compton Inc.

McDONALD

THE QUALITY NAME IN GAS SERVICE STOPS

When you buy McDonald iron body gas service stops, shown below, you're assured of many years of long service. They are manufactured from the very finest materials. Over 100 years of engineering skill and experience in manufacture are further assurances of the very highest quality. Look for the name McDonald next time you buy.

iron body service stops

PLATE 10685

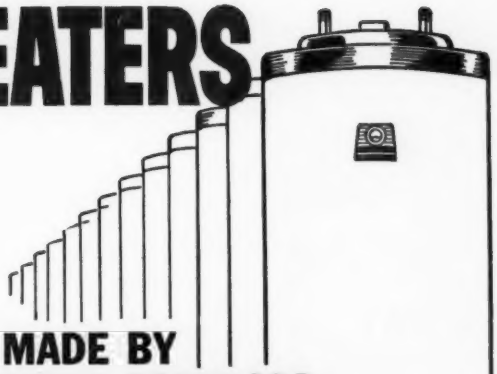
PLATE 10687

Where valves of this type are required or preferred, Plates 10685 and 10687 are guaranteed to give satisfactory service. All stops have iron bodies and bronze keys which are precision fitted and individually lapped. Each valve is individually tested and packaged in standard cartons to comply with A.G.A. specifications. Available in black or galvanized finish. Sizes — ½", ¾", 1", 1¼", 1½", 2".

For information on the complete line of McDonald gas service stops, write for free catalog.

A. Y. McDONALD MFG. CO.
Dept. G-1059, 12th & Pine
DUBUQUE, IOWA

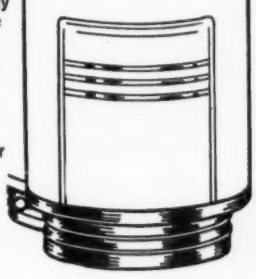
THERE IS ONLY ONE LINE OF PERFORMANCE RATED WATER HEATERS



IT'S MADE BY AMERICAN-STANDARD

THE PEOPLE WHO KNOW PLUMBING AND WATER HEATING BEST!

- With Performance Rating you easily match your customer's needs to the right size "rated" water heater.
- Performance Rating quickly makes you the water-heater expert; gives you quality and service to sell.
- Performance Rating means your customers won't run out of hot water
- Glass-lined or galvanized steel tank; 20 to 65 gallons; full price range.



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AMERICAN-Standard
PLUMBING AND HEATING DIVISION

There are more than 6000 types and sizes of Dresser® service fittings!

regular...

insulating...

extra rugged...

easily installed...

permanently gas-tight.

Dresser is the only manufacturer supplying a pipe coupling or fitting for every need in the gas industry.

DRESSER MANUFACTURING DIVISION

Bradford, Pennsylvania

TRADE LITERATURE

23. Hydronics

The inside story on how to heat homes effectively with hot water is told in a new 30-minute, 16 mm color-sound film produced by A. O. Smith's Permaglas division. "Hydronics With Magic Heet" covers techniques required for quality heating installations, components required for best performance, pitfalls to avoid, and advantages of hydronics using Magic Heet.
A. O. Smith Corp.

24. Crane-excavator

Schield Bantam's new self-propelled 11-ton CR-350 crane excavator is described in a new bulletin. The 12-page, 2-color bulletin describes the CR-350 as well as the complete line of Bantam-built front-end attachments.
Schield Bantam Co.

25. Automatic controls

A 56-page catalog lists White-Rodgers entire line of automatic controls for heating, refrigeration and air conditioning. Many new products are listed for the first time. Specifications, plus a description of operation and general applications, are included in each product listing.
White-Rodgers Co.

26. Pipe wrap tape

Protection from corrosion is provided by Minnesota Mining's new tape wrap, described in literature. Designed specifically for wrapping straight pipe sections, the tape is a pressure-sensitive, vinyl type. A new balanced high tack adhesive is used with extra internal strength to stop tape displacement caused by movement of soil or pipe.
Minnesota Mining

27. Gas drive

Rockwell's Gas Drive, a completely self-contained air- or gas-powered instrument drive and timing unit, is covered in new literature. The Gas Drive, according to the 4-page bulletin, will operate indefinitely and without attention.
Rockwell Manufacturing Co.

28. Vacuum cleaners

Air Jet portable vacuum cleaners, for use in hazardous areas, are described in a new bulletin. Powered from existing compressed air lines, the units have no motors and no

Model G

Model H

Testing barhole for gas leakage

Two J-W portable gas detectors give reliable, trouble-free service

J-W SNIFFER, Model G, is used for a general-purpose combustible gas detector. Scale is graduated from 0-1.0 l.e.l. (lower explosive limit) for all common gases and vapors. Light in weight (4 lbs.), simple to use and maintain.

J-W GAS-POINTER, Model H is ideal for testing barholes for underground leaks in natural gas lines. Also used for testing manholes, valve boxes, etc. Two scales: 0-1.0 l.e.l. and 0-100% (pure) gas. Exclusive design eliminates electrical switching or zero shift when changing from one range to the other.

Descriptive literature on request.

J-W Johnson-Williams, Inc.
Palo Alto 11, California

Synonymous with safety since 1927

Canadian customers please write:
Safety Supply Co., Toronto, Ont.
Fleck Bros. Ltd., Vancouver, B.C.

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electrical wiring. Non-sparking operation is assured and the cleaners may be used safely in dust or fume-filled atmospheres.
Spencer Turbine Co.

29. Orifice plate

Orifice plates, sealing units, and right-type joint plate holders are covered in Catalog Section G from Daniel Orifice Fitting Co. Universal size orifice plates for use in Daniel orifice fittings are included, as well as paddle-type orifice flange plates and plates for Daniel flow sections.
Daniel Orifice Fitting Co.

30. Plug valves

Rockwell's Hypresphere line of full-opening, lubricated spherical plug valves is described in a 10-page bulletin. The photo-illustrated bulletin contains design details, operating features, and manufacturing standards. Also drawings, specifications and dimensions for the entire line.
Rockwell Manufacturing Co.

31. True-scale models

True-scale models, an important engineering tool, are described in a booklet from Commonwealth Services. Commonwealth's model shop, with the latest equipment to build all types of scale models, is covered.
Commonwealth Services Inc.

32. Ink marker

A disposable fountain pen which holds its ink in a polyethylene tube is described in literature from Organic Products Co. The OPCO marker writes on metals, plastics, glass, rubber, magnetic tapes, and most other surfaces—porous or non-porous.
Organic Products Co.

33. Crawler-tractor

A new 14-page catalog (MS-1318) covers Allis-Chalmers HD-16 crawler tractor powered by the new A-C 16000 engine. Featured in the catalog is a fold-out cutaway view of the HD-16 with descriptive marginal notes.
Allis-Chalmers Mfg. Co.

34. Drill pipe

Youngstown's 8-page brochure on seamless drill pipe presents the complete range of weights, sizes, and grades. Charts show physical properties, etc.
Youngstown Sheet & Tube Co.

CUT 20" CAST IRON PIPE
in Less Than 8 Minutes...

...with the New REED
ROTARY CUTTERS
(4 sizes cover the range from 10" cast iron to 26" steel pipe)

These one-man Reed Rotary Cutters cut large diameter steel or cast iron pipe *faster and better than the heaviest power machines* . . . and without electrical or explosive hazards. What's more, there's less digging in ditch-work! You need only a 4" to 6" channel under the pipe and a 45° to 60° arc for the handle swing. Reed Rotaries are easy to "carry in", too. The 20" size weighs only 68 pounds; separates into 3 easily carried parts. Patented pipe guide assures clean, right-angle cuts. Four razor blade wheels track perfectly, cut easily and are quickly interchangeable for steel or cast iron pipe.

- Write today for descriptive literature.

These typical cuts on 12, 16, 20 and 24" cast iron pipe illustrate the clean, accurate, right-angle cuts provided by Reed Rotary Cutters.

REED
REED MANUFACTURING COMPANY
ERIE • PENNSYLVANIA

DRESSER®
COUPLINGS

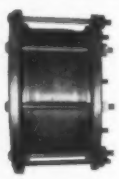
STYLE
38

INSULATING
COUPLINGS

STYLE
39

REDUCING
COUPLINGS

STYLE
62



SOLVE YOUR
PIPE
CONNECTION
PROBLEMS

DRESSER
MANUFACTURING DIVISION
Bradford, Pennsylvania

associations • *Continued*

from page 123

Gas cleaning equipment study published

Evaluations of gas cleaning equipment are presented in a new research report from AGA. Results of the industry-sponsored research project provide a foundation for the design and development of more efficient gas cleaners.

AGA's pipeline research committee studied analytical procedures, cleaning efficiencies, oil losses, pressure drops, and dust loading characteristics of six gas cleaning units. Equipment evaluated included a filter cleaner, a centrifugal separator and four oil-bath scrubbers.

Pressure drops and cleaning efficiencies were established for each unit. Oil losses were determined for the oil-bath cleaners. Gas through-put rates were varied from 50 per cent to at least 125 per cent of the manufacturers' ratings to find the effect of flow rate on these factors.

The report, "Performance of Commercial Gas Cleaning Equipment," is available for $2 from the AGA, 420 Lexington Ave., New York 17.

Heating control manual published

AGA has published a new handbook for servicing controls on gas central heating equipment and space heaters.

The "AGA Gas Heating Controls Service Manual" combines in one volume service instructions for the various makes and models of controls in general use. It is designed for one-the-job use.

Periodical supplements, keeping the manual up to date, will be supplied on a subscription basis.

Price of the manual without supplement service is $5.50 per copy. Subscriptions for 3-year supplement service are $4 each. Price of both manual and supplement is $9.50.

Divisions add member

H. C. Little Burner Co. Inc., San Rafael, Calif., has been elected to membership in GAMA's gas water heater and gas incinerator divisions. Little has been a member of the association's direct heating equipment, floor furnace, and gas boiler divisions for several years.

STOP H_2S
CORROSION
BEFORE
IT STARTS!

The Connelly IRON SPONGE purification process at the well site removes hydrogen sulphide BEFORE the gas is piped to central processing. Thus, the cause of pipe line corrosion is eliminated because corrosive gas never enters the transmission lines. Additionally, Connelly IRON SPONGE eliminates the need for extreme close control. It operates with high efficiency at low or high pressures—absorbs more H_2S, gives longer service between foulings and is easily regenerated. If you have a purification problem check this MOST ECONOMICAL solution today. Write for Field Processing Bulletin #OG-7.

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Elizabeth, New Jersey

GAS · PEOPLE

T. H. Evans
Carnegie

J. S. Schuchert
Equitable

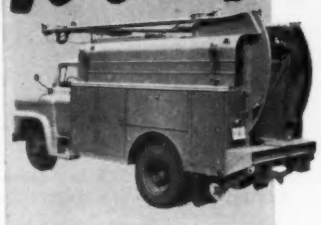
JOSEPH S. SCHUCHERT has been elected vice president in charge of sales at Equitable Gas Co., Pittsburgh. He succeeds T. H. EVANS, who has resigned to become vice president of Carnegie Natural Gas Co. Schuchert will direct all sales, advertising, promotion, and public relations work for Equitable. Most recently he was manager of commercial sales for the Duquesne Light Co. in Pittsburgh. Evans is a 22-year veteran at Equitable, having joined the company in 1937. In 1952 he was named vice president of Kentucky - West Virginia Gas Co., Equitable subsidiary. A year later he became vice president in charge of sales.

Southern Indiana Gas & Electric Co., Evansville, Ind., recently elected the following officers: HARVEY J. BELL, vice president and treasurer; L. H. MEYER, treasurer, succeeding the late C. B. FROELICH; E. P. HUBER, assistant secretary; C. W. KROENER, assistant treasurer; and SAMUEL G. CLIFFORD JR., assistant comptroller.

ROBERT L. KOOB has joined Allis-Chalmers Manufacturing Co. as director of public affairs, a newly created post. He will act as consultant on government affairs to all divisions of the Milwaukee-based company.

RAYMOND A. HIBLER has joined the industrial relations department of Commonwealth Services Inc., New York. He will work as a consultant in the areas of organization planning, wage and salary administration and labor relations. Commonwealth also announced the appointment of JAMES M. MCTAVISH as general purchasing agent. He succeeds J. G. SHANLEY, who retired in July.

Koenig ALL-STEEL UTILITY BODIES

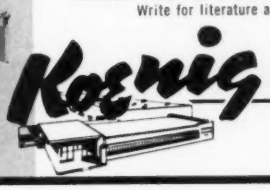


LINE-CONSTRUCTION BODY
. . . available in 9' to 14'6" lengths with mechanical or hydraulic winch and derrick, or any other special or custom equipment desired. Compartments can be arranged to your specifications.

SERVICE BODIES
. . . for ½-, ¾-, and 1-ton chassis. Electrically welded into one unit with six waterproof compartments, recessed paddle handles keyed alike and fender skirt protected with die-formed rolled edges. Built for safe, dependable service . . . will outlast several chassis.

3-WAY DUMP BODIES
DUMP to the RIGHT, LEFT and REAR
All-steel welded bodies available in 8' to 11' lengths. The multistage telescopic hoist has a lifting capacity of 25,000 lbs. This is the ideal body for safe dumping under hazardous conditions . . . especially adaptable for windrowing and backfilling.

YOU CAN BE SURE OF QUALITY MATERIALS AND WORKMANSHIP WHEN YOU SPECIFY KOENIG PRODUCTS
Write for literature and specific information today.

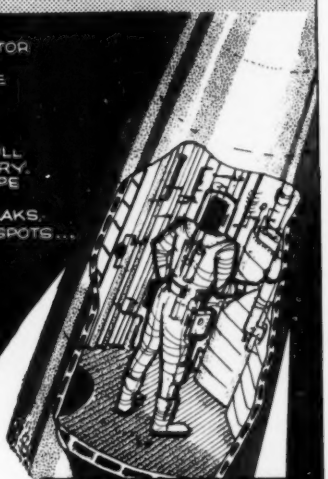


Koenig IRON WORKS, Inc.
P. O. BOX 7726
HOUSTON, TEXAS

DESTINATION: TOMORROW!

TODAY THE E/4 SHOULDER HOLIDAY DETECTOR AND THE E/P PULSE TYPE DETECTOR FOR DAMP CLIMATES ARE ANSWERING THE PIPELINER'S NEED FOR A DEPENDABLE, FULLY PORTABLE, GENERAL PURPOSE ELECTRICAL INSPECTION INSTRUMENT.

BOTH MODELS CAN BE USED FOR A FULL DAY WITHOUT RECHARGING THE BATTERY. ALL WRAPPED SURFACES INCLUDING PIPE CAN BE QUICKLY AND ACCURATELY INSPECTED FOR VOIDS, PINHOLES, BREAKS, SCRATCHES AND BURNED OR COKED SPOTS...



TOMORROW THESE SAME DETECTORS WILL BE USED IN THE INSPECTION OF TUBING ON OUTER SPACE ROCKETS, FOR TINKER & RASOR DETECTORS ARE DESIGNED FOR THE FUTURE.

DISTRIBUTORS: Crutcher-Rolfs-Cummings Inc., Houston, Texas • Remco Manufacturing Co., Inc., Tulsa, Oklahoma • Canadian Equipment Sales & Service Ltd., Edmonton, Alberta, Canada • Bob Herrick, Rentals & Service, Harrisburg, Penna. • Falcon Line Products Corp., Elizabeth, N. J. • Export Agents . . . Frazer & Hanson Ltd., San Francisco, Calif.

Electronic Detectors for every Industry
TINKER & RASOR
417 AGOSTINO ROAD, P. O. BOX 281, SAN GABRIEL CALIFORNIA

Chilton
PUBLICATIONS

Foremost IN THE FIELDS THEY SERVE

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56th & Chestnut Streets
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Sherwood 8-2000

Stella Kruizenga
Michigan

Herbert Clark
Pacific Lighting

STELLA KRUIZENGA has been named secretary of Michigan Gas Utilities Co., Coldwater, Mich. Miss Kruizenga started as a clerk with the company in 1928.

Three assistant vice presidents have been named by Stone & Webster Engineering Corp. They are ROBERT S. BOYD, appraisal manager, and J. MARSHALL HAMILL, administrative assistant, both in Boston; and WILBUR S. ROBERTS JR., manager of new business activities in New York.

HERBERT L. CLARK is now staff assistant in immediate charge of accident prevention activities of Pacific Lighting Gas Supply Co., Los Angeles. He will also handle some personnel work. Clark has been with the storage and transmission subsidiary of Pacific Lighting Corp. since 1951.

CLARANCE E. BAKER has been appointed coordinator of sales of Reynolds Gas Regulator Co. Inc., Anderson, Ind. Before the appointment, Baker was eastern regional sales manager for Arkla Air Conditioning Corp., Evansville, Ind.

ERNEST L. GROVE JR. has been named to the newly created post of executive assistant to Connecticut Light & Power Co.'s vice president and treasurer, L. J. Reynolds. Grove, with Connecticut Light since 1949, has been an accountant on the controller's staff.

ALAN D. HALL has been promoted to comptroller of Northern Ontario Natural Gas Co. Ltd., Toronto, Ont. Hall joined the company earlier this year.

American Meter Co. has transferred EUGENE D. ROUSE from the Garland, Texas, sales office to the Houston office. At the same time, CLAY G. BRASWELL transferred to Garland from Houston.

AMERICAN®
AL-175
ALUMINUMCASE METERS

LIGHT WEIGHT
AND RUGGED

Precision-built AL-175 Aluminumcase meters are unequalled for dependable, economical domestic service. American's quality features assure maximum accuracy from pilot load to full rated capacity. And these light weight A.G.A. Class 175 meters provide important economies in shipping, handling and setting costs.

- One-piece, die-cast aluminum alloy body.
- 3-Convolution, molded Duramic diaphragms.
- Leakproof grommet-type seals.
- Reinforced flag rods.
- Self-lubricating porous bronze bushings.
- Vented, plastic index box.
- Rated capacity 175 cfh of 0.60 sp. gr. gas at ½-inch w. c. differential. Working pressure 5 psi.

Ask your American representative for Bulletin 305.

AMERICAN®
METER COMPANY
INCORPORATED (ESTABLISHED 1836)

General Offices: Philadelphia 16, Pa.
Sales Offices in Principal Cities

WALTER H. KUSSMAUL has been named vice president of purchasing and stores for Northern Indiana Public Service Co., Hammond, Ind. Kussmaul, a 36-year man with NIPSCO, was vice president of division operations. DALE W. ANDERSON is now manager of division operations. Northern Indiana also announced that EARL L. MANN is manager of gas engineering, succeeding JOSEPH A. PELLETIER. Pelletier has been named manager of electrical engineering, Anderson's former post.

F. LAWRENCE DOHERTY, assistant personnel manager of Stone & Webster Engineering Corp. since 1951, has been promoted to personnel manager.

ROBERT C. NEAIDENGARD, headquarters office manager—sales, has been elected controller of Rockwell Manufacturing Co., Pittsburgh.

LILY GEORGENE JOHNSON has been named southwestern home service representative for the Norge Division of Borg-Warner Corp. Miss Johnson will be responsible for product demonstrations and other home service operations in Arkansas, Kansas, Louisiana, Oklahoma, New Mexico, and Texas.

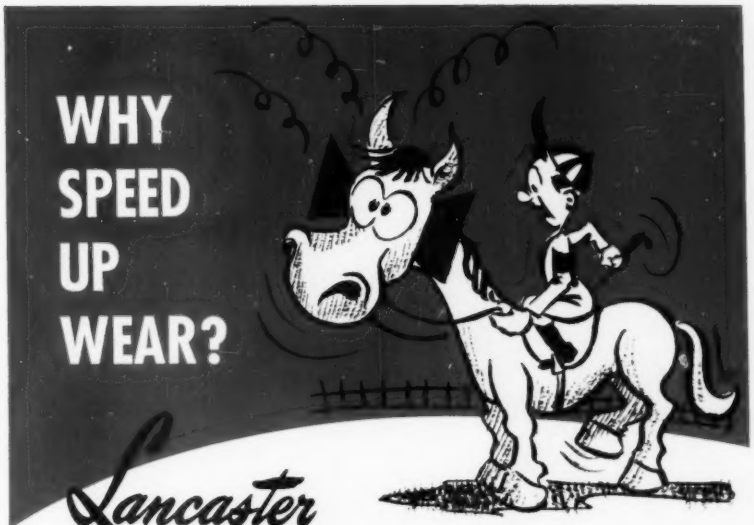
WALTER LEE is manager of Iroquois Gas Corp.'s East Aurora (N.Y.) district. He succeeds the late JOSEPH P. MADIGAN. Succeeding Lee as manager of the Arcade division is GERALD ORCUTT.

CHARLES T. POOLE has opened engineering offices in Lubbock, Texas. Formerly with Pioneer Natural Gas Co., Poole most recently served as division engineer—distribution.

DONALD KUHLENSCHMIDT has been named development engineer for Arkla Air Conditioning Corp., Evansville, Ind.

WILLIAM F. NEWBOLD is director of research for the Brown Instruments division of Minneapolis-Honeywell Regulator Co. He succeeds WALTER P. WILLS, director since 1955, who has been named technical advisor to the director of engineering, a new post.

JOSEPH BANDROFCHECK was elected assistant controller of Robertshaw-Fulton Controls Co. recently. He has been chief accountant.



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non-crack SYNTHETIC DIAPHRAGMS

O improve gas meter accuracies without any changes in index gear ratio or standard parts

High flexibility, low differentials and superior performance proved in both service and laboratories are built right into Lancaster diaphragms S-7-L (and S-700-L with carrier wire and gaskets attached) for Sprague 1-A Gas Meters.

There's no cloth lining, no fabric failure . . . gas meters can keep operating at the speed they were designed for! No need to hurry up meter wear.

Lancaster's superior synthetic materials are also available in these diaphragms: C-1-L for #1 Ironclad, O-L for #0 Emco and #1-L for #1 Emco Meters.

Increase meter accuracy . . . without increasing meter wear —Order Lancaster Synthetic Diaphragms!

"a meter is only as accurate as its parts"

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Manufacturers of Quality Parts for Gas Meters

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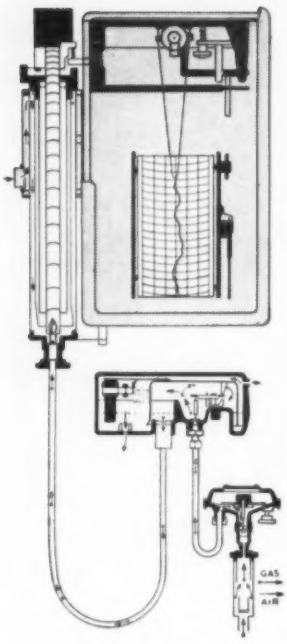


Sigma
Wobbe Index Recorder
THE WORLD'S FIRST

Now, Sigma's Wobbe Index Recorder gives you a continuous record of *actual* thermal delivery.

$$\text{Wobbe Index} = \frac{\text{Calorific Value}}{\sqrt{\text{Specific Gravity}}}$$

This instrument is reliable and relatively inexpensive. Recordings are highly accurate. An optional unit will also control Wobbe Index if desired.

The Flow Regulator regulates gas flow to the burner. It senses slight changes in specific gravity and compensates for changes in barometric pressure and room temperature.

The Recording Mechanism is actuated by the heat of the combustion of the gas. Responds rapidly to changes in Wobbe Index. Not affected by normal temperature and pressure changes. Highly sensitive, frictionless magnifying system. All parts well protected against corrosion.

Write For Further Information

COSA — *National Representatives for Sigma Instrument Co., England*

COSA CORPORATION, 405 LEXINGTON AVENUE, NEW YORK 17, N. Y.

Introducing Burney BTU, in one of his many action shots for promoting the various uses of natural gas and liquid petroleum gas in the home.

Burney Battles The Cold With Gas Heat!

For additional information
Write D. C. Will, 617 E. High
Jefferson City, Mo.

Modern Methods developed by HEATH give you new Safety Survey work to control leakage . . .

Mobile Infra-red analyzer (IR units) are used to make your Heath Leakage Control Survey more complete. New Auto-Test-Inserts ("A-T-I" units) used in downtown areas, further improve the Safety factor.

Write for information about Heath Surveys to meet your special needs.

The Safety Service That Saves Gas

HEATH
Survey Consultants, Inc.
378 Washington St., Wellesley Hills 81, Massachusetts

As part of its field sales organization, White-Rodgers Co. has formed a technical advisory group. Its job is to spread technical product information from general offices to the sales force. Also, to assist in the application of White-Rodgers controls to customer products. First members named to the group are WALTER W. SCOTT, field engineer for the company since 1950, and FRANK CRAWFORD, most recently New York district manager.

HAMILTON KING, 30-year veteran with Atlanta (Ga.) Gas Light Co., has been made manager of the Buckhead office. The former manager of the company's Sandersville office succeeds LEWIS A. HAMILTON, who retired.

Charles Kuhn
Dresser

CHARLES KUHN has been appointed vice president-sales manager of Dresser Manufacturing Division, one of the Dresser Industries. Kuhn joined the Bradford, Pa. company as sales manager in February 1958. Prior to that he was general sales manager of Hills-McCanna.

HAROLD R. SNEDDON has been promoted to East Liverpool (Ohio) division manager for Ohio Valley Gas Co. He succeeds W. T. MCINTYRE, who has retired. Sneddon has been East Liverpool plant service foreman.

WARREN G. PARMENTER has been named manager of Walworth Co.'s plastic section. He will be in charge of the development and related activities pertaining to plastic valves and fittings.

BRUCE R. HESTER has joined Topaz Pipeline Specialty Co., Houston, as sales engineer. He will represent Topaz in Houston, east Texas, and Louisiana.

JAMES E. PITMAN has been named manager of product planning for point-to-point communication equipment in General Electric's communication products department in Lynchburg. He succeeds KENT J. WORTHEN, recently named national sales manager for G-E two-way radio.

CHARLES W. DORIETY has been named head of the York county S. C., operations of Carolina Pipeline Co.

ROBERT M. PICHARD has been named Piedmont manager by the Cumberland (Md.) & Allegheny Gas Co. He succeeds the late MARION F. REEVES.

WILLIAM D. CURLEE has been named general counsel of Consolidated Gas Utilities Corp., Tulsa.

FRANK CREEL has been named Durham district manager by the Public Service Co. of North Carolina, Gastonia, N. C.

JOHN A. BELANGER is sales manager of the commercial cooking equipment division of Cribben & Sexton Co., Chicago . . . WILLARD F. ROCKWELL, president of Rockwell Manufacturing Co., has been reappointed to serve on the Advisory Council of the United States Committee for the United Nations . . . H. THOMAS STROOP has been named to the post of field sales supervisor, refrigerator division by Whirlpool Corp. Succeeding him as refrigerator promotion manager is QUENTIN B. GARMAN.

HUGH H. FOREMAN, special engineer on the industrial sales staff at Southern California Gas Co., Los Angeles, was elected president of the National Association of Power Engineers recently . . . PAUL F. ARMBRUSTER, until recently on roving assignment as distributor development manager for Whirlpool Corp., is now southwestern regional manager for the company. He succeeds BERNARD P. COLLINS, transferring to California as a district manager for Whirlpool's gas utility division.

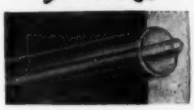
New utility administrator coordinator for Borg-Warner Corp.'s Norge division is GEORGE M. KOVAC . . . VICTOR L. KLEIN has taken over the newly created post of director of advertising and promotion for Caloric Appliance Corp., Jenkintown, Pa. . . .

Length after length . . . Mile after mile . . . Every inch of

BUSADA BUTYRATE (PLASTICS) GAS PIPING IS IDENTICAL!

IT'S CLEAR! YOU CAN SEE IT'S BY Busada

It is transparent . . . made from one specific material formulation containing the same physical properties shipment upon shipment. Its high quality is constant. Made to same O.D. as steel pipe with 2 wall thicknesses. Close tolerances insure leakproof, trouble-proof ease of installation. Complete line of fittings.



Butyrate pipe now available in black

Made by Busada Mfg. Corp., for

BUSADA SUPPLY CO. INC. 32-21 DOWNING STREET FLUSHING 54, NEW YORK

Representatives in: Boston, Los Angeles, Shreveport, La., Kingsport, Tenn., Grand Rapids, Mich.

Faster **LOCATING!**

LOWER SERVICE COSTS with the improved AQUA VALVE BOX **LOCATOR!**

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STOCK this useful tool for every service CAR and CALL • Speed Locating • Keep Customers Happy

- **NO WIRES, BATTERIES or SWITCHES**—simple, powerful magnetic action, factory adjusted to YOUR geographical location assures unfailing results!
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New, glamorous pool accessory

GAS **Torchlites**

Distinctive and unique GAS TORCHLITES add that final touch of romance and charm to the poolside setting. GAS TORCHLITES burn with a foot-high, dancing yellow flame, installed singly or in clusters.

BIG EXTRA ADVANTAGE—destroying Mosquitos, moths and other pesty insects.

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VALLEY, NEBRASKA

HOW DO AUBURN TRENCHERS CUT THE PRICE of a GOOD DITCH?

- Low Initial Cost
- Less Maintenance
- Less Downtime
- One-man Operation
- Speed on the Job

When you see how the Auburn digs in soil conditions that no other trencher can, operates up to 800 feet per hour, and automatically adjusts speed to changing soil conditions, you'll understand why so many dollar-wise users buy Auburn. It has a simple, trouble-free design that has been proven through years of service.

Trenches 6 to 14 inches wide and down to 6 feet. Special bits are available for rock, shale, and frozen ground.

Auburn is the world's largest producers of trenchers.

Tractor-mounted trenchers are available for M-F Work Bulls, IH Utility, John Deere Crawler and Wheel Industrial, and Ford Tractors.

the original Jeep-mounted trencher, and only trencher approved by Willys Motors. Available at Jeep Dealers.

AUBURN MACHINE WORKS, INC. AUBURN, NEBRASKA, U.S.A.

A BILLION cu. ft. LEAK!

If all the leaks Southern Cross Foresters located and repaired in 1958 were combined the result would be a colossal *billion cu. ft. per hour* leak!

Vegetation Method, Safety and Combination Surveys by SCF will find your unaccounted-for. Fully equipped, thoroughly experienced repair crews will make your repairs without forcing you into costly build-up of equipment and personnel. We would like to tell you more.

SOUTHERN CROSS FORESTERS
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for leakproof, pressure-tight connections

use TiteSeal®

SEALING COMPOUNDS

Heat and vibration-proof, non-solvent, will not shrink, crack or crumble. Makes all assemblies leak-proof and pressure-tight. Prevents rust, corrosion, joint seizure.

7 BASIC BLENDS

LIQUID WRENCH®
The super-penetrating rust solvent

LOOSENS rusted bolts, nuts, screws, 'frozen' parts

Liquid Wrench works *fast*... yet is absolutely safe for all metals and alloys.

2171

At Industrial, Automotive, Hardware, Plumbing Jobbers

RADIATOR SPECIALTY CO.
Charlotte, North Carolina

SOLDER SEAL

MARTIN J. MCCULLOUGH has been appointed assistant manager of industrial relations for Northern Indiana Public Service Co., Hammond, Ind. McCullough has been with NIPSCO for more than 30 years, starting in 1929 as a clerk in the accounting department. He also served as a supervisor in the industrial relations department and most recently as manager of employment and employee welfare.

NEWTON ZAHNISER has been named sales manager of Superior Meter Co. Most recently, Zahniser was assistant to the president of Norton - McMurray Manufacturing Co. Before that, he was with Dresser Industries and Koppers Co.

Deaths

John B. Wallis, secretary and personnel administrator of Pacific Lighting Gas Supply Co., died recently. He was 56. Mr. Wallis joined Pacific Lighting in 1942 as chief gas accountant.

EDWARD J. O'NEILL, 64, assistant treasurer of Consolidated Edison Co. of New York, died recently. He had been with Con Edison for almost 45 years. In 1943, he was selected for the company's executive development program. In this connection, he served as manager of the commercial buildings and properties department, system commercial manager of the commercial relations department, and manager of the distribution operations department.

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Nationally-known management consulting organization needs man with operating utility rate experience, preferably with engineering degree, for work with clients. Extensive travel. Salary commensurate with training and experience. Send resume and salary requirement in first letter. Our employees have been advised. *Replies confidential. Box 1091, GAS Magazine, 198 S. Alvarado St., Los Angeles 57, Calif.*

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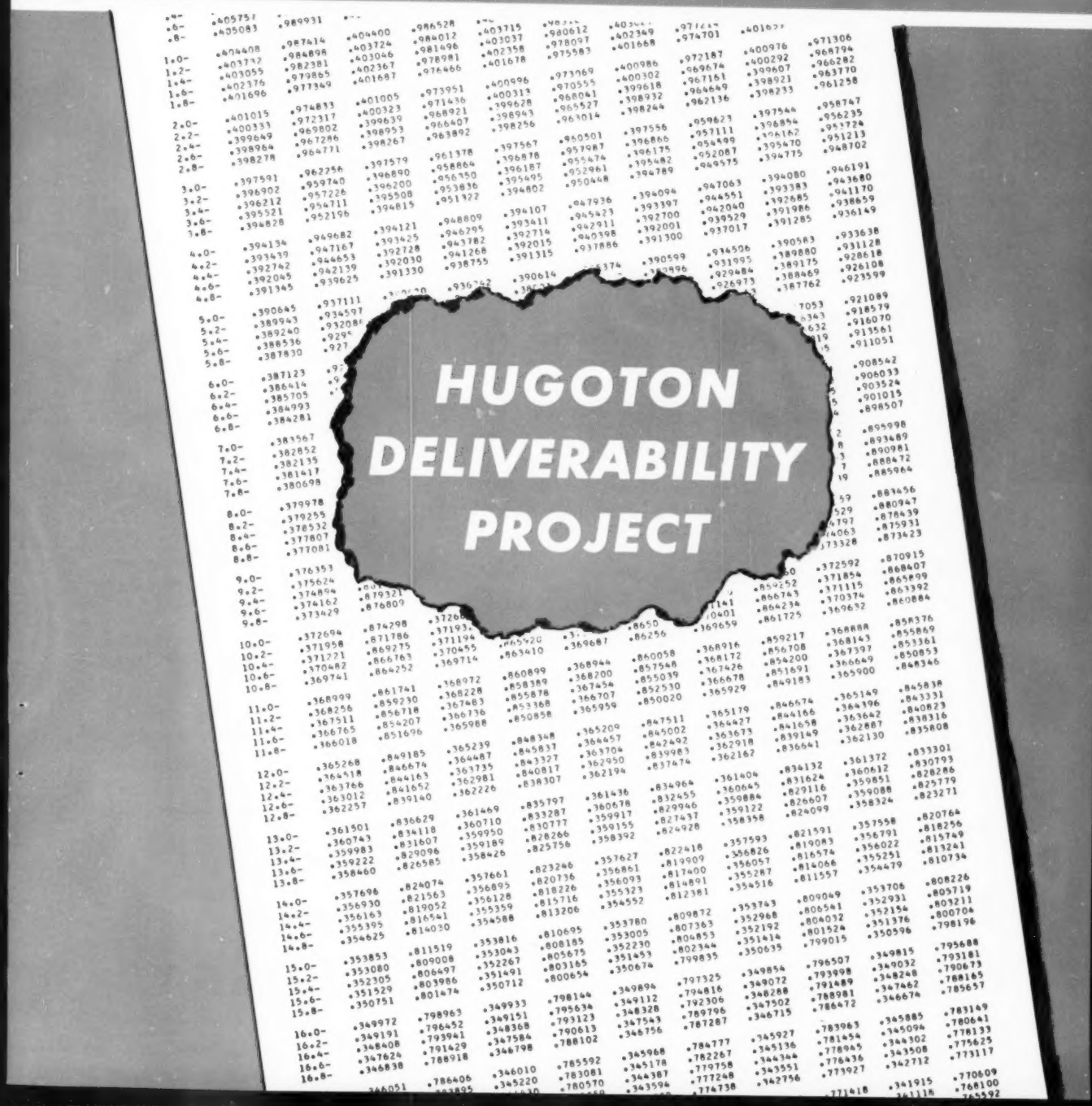
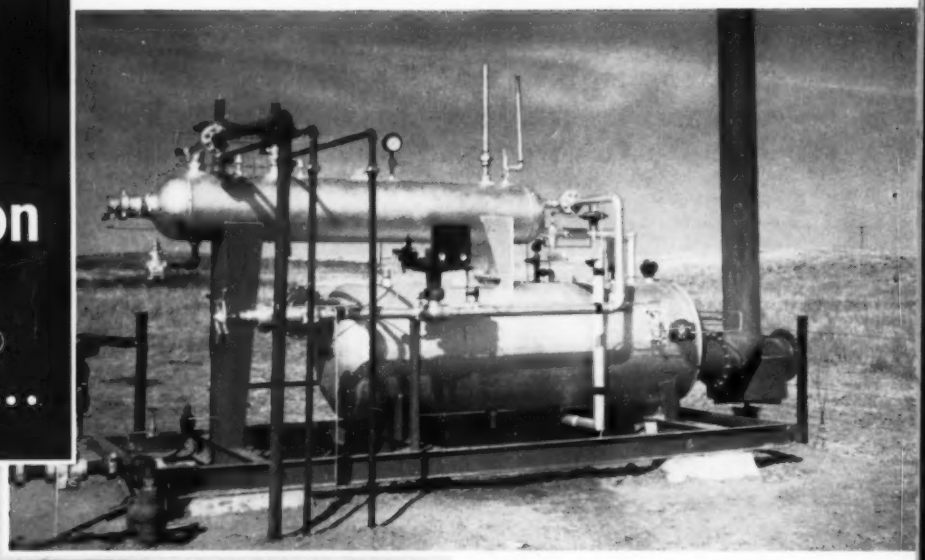
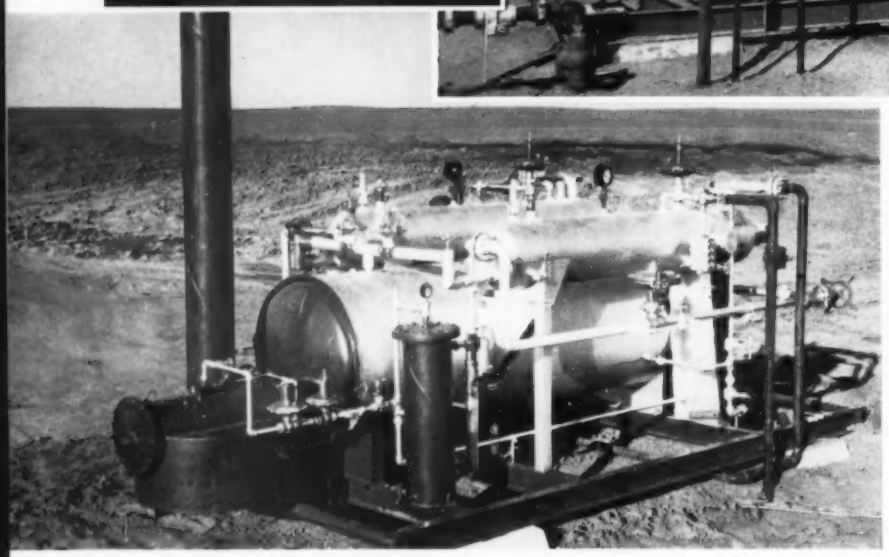
GAS

PIPELINE SECTION



Another all new "Production Pak" by National®...





Compact design and construction with built-in safety features assure the producer trouble-free operation.

Dual producing "Production Pak" with one steam generator, two three-phase separators, flame arrestor and safety fuel gas scrubber.

Patented and Patents Pending

National Steam Generating Production Unit Model "WOG"

The National Steam Generating "Production Pak" is a pre-piped, skid-mounted, three-phase separation system with a steam generator. This production unit is specially designed to produce wells that require pre-heat before choking down to separator pressures.

Automatic controls and valves maintain absolute control over water bath temperatures and sales gas leaving separator.

Use of a steam generator to heat the separator base and well stream in place of the conventional water bath heater method permits a higher MTD and less area requirement plus a convenient and dependable means of moving heat to the base of the separator.

Separator and generator are code stamped, and the unit is equipped with National's Flame Arrestor to prevent back flash.

These units have been proven in service in Oklahoma, Kansas and the Texas Panhandle.

National's Steam Generating Production Units are available in sizes from 2.5 MM cf/d to handle single, dual and triple completed wells.

It's National®

NATIONAL TANK COMPANY

DRAWER 1710

TULSA, OKLAHOMA

GAS exclusive

Hugoton field deliverability project

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THE data processing center at Northern Natural Gas Co. recently prepared a set of tables to be used in solving deliverability problems.

The design of the tables together with the formulas on which they are based were originated by Harry F. Stevens, supervising general engineer, Federal Power Commission, Washington, D. C. Their primary purpose was to assist the commission technical staff, natural gas pipelines and state commissions in forecasting future rates of gas production involving the Kansas and Oklahoma portions of the Hugoton field, or any field operating under a similar proration system.

Our data processing group used its Burroughs 205 electronic digital computer system to handle the calculations and to print out the original tables. The originals were afterwards reproduced and bound into book form.

Computer time required to complete this project was four hours to test or debug the program, and 160 hours for actual calculation. The book consists of 1236 pages, with 100 lines per page and 10 printed factors per line. Calculation time required for each factor was approximately one-half second.

All pages of the book are similar in that they show field average wellhead pressures at the top of the page and the company variation from these pressures down the left-hand side of the page (see attached tables). There are two results, or factors, shown under each field pressure and opposite each company variation in pressure. These two factors are differentiated by a (1) or (2) above the column in which the factor is located. The No. 1 factor can be divided into the state deliverability to obtain the open flow of the well at the average company pressure. Or the open flow may be multiplied by the appropriate No. 1 factor to obtain the state deliverability. The No. 2 factor can be divided into the state deliverability to obtain the state deliverability at 388 psia.

Once this state deliverability at 388 psia is determined, it may be used to arrive at the state deliverability via the table for any well or average of wells at any other lower pressure during its projected life. To be more specific, multiply the state deliverability at 388 psia by the No. 2 factor shown under the average field pressure of the field concerned and opposite the company variation pressure from this field pressure. This gives the desired state deliverability.

These table factors were calculated to the seventh place after the decimal and rounded to the sixth

Text continues on page 150. Reproductions of some of the tables appear on the next four pages.

FOR WELL OR AVERAGE WELL; WITH "n"=.85 AND DELIVERABILITY STANDARD PRESSURE EQUAL TO 80% OF FIELD AV SIWP (PSIG)
COL.1. IS RELATION OF COMPANY STATE DELIVERABILITY TO COMPANY OPEN FLOW AT COMPANY AV. PRESSURE
COL.2. IS RELATION OF COMPANY STATE DELIVERABILITY TO COMPANY STANDARD DELIVERABILITY AT 388, PSIA
WHEN COMPANY AV. PRESSURE VARIES FROM FIELD AV. PRESSURE AS INDICATED.

VARIATION COMPANY AVERAGE PRESSURE	388.0		387.8		387.6		387.4		387.2	
	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)
.0	.407770	1.000000	.407764	.999109	.407758	.998218	.407751	.997327	.407745	.996437
.2	.407100	.997482	.407094	.996592	.407087	.995702	.407080	.994812	.407074	.993923
.4	.406429	.994965	.406422	.994076	.406415	.993187	.406408	.992298	.406401	.991409
.6	.405757	.992448	.405749	.991560	.405742	.990671	.405735	.989784	.405728	.988896
.8	.405083	.989931	.405075	.989044	.405068	.988156	.405060	.987269	.405053	.986383
1.0	.404408	.987416	.404400	.986528	.404392	.985641	.404384	.984755	.404376	.983870
1.2	.403732	.984898	.403724	.984012	.403715	.983126	.403707	.982241	.403699	.981357
1.4	.403055	.982381	.403046	.981496	.403037	.980612	.403029	.979728	.403020	.978844
1.6	.402376	.979865	.402367	.978981	.402358	.978097	.402349	.977214	.402340	.976331
1.8	.401696	.977349	.401687	.976466	.401678	.975583	.401668	.974701	.401659	.973819
2.0	.401015	.974833	.401005	.973951	.400996	.973069	.400986	.972187	.400976	.971306
2.2	.400333	.972317	.400323	.971436	.400313	.970555	.400302	.969674	.400292	.968794
2.4	.399649	.969802	.399639	.968921	.399628	.968041	.399618	.967161	.399607	.966282
2.6	.398964	.967286	.398953	.966407	.398943	.965527	.398932	.964649	.398921	.963770
2.8	.398278	.964771	.398267	.963892	.398256	.963014	.398244	.962136	.398233	.961258
3.0	.397591	.962256	.397579	.961378	.397567	.960501	.397556	.959623	.397544	.958747
3.2	.396902	.959740	.396890	.958864	.396878	.957987	.396866	.957111	.396854	.956235
3.4	.396212	.957226	.396200	.956350	.396187	.955474	.396175	.954599	.396162	.953724
3.6	.395521	.954711	.395508	.953836	.395495	.952961	.395482	.952087	.395470	.951213
3.8	.394828	.952196	.394815	.951322	.394802	.950448	.394789	.949575	.394775	.948702
4.0	.394134	.949682	.394121	.948809	.394107	.947936	.394094	.947063	.394080	.946191
4.2	.393439	.947167	.393425	.946295	.393411	.945423	.393397	.944551	.393383	.943680
4.4	.392742	.944653	.392728	.943782	.392714	.942911	.392700	.942040	.392685	.941170
4.6	.392045	.942139	.392030	.941268	.392015	.940398	.392001	.939529	.391986	.938659
4.8	.391345	.939625	.391330	.938755	.391315	.937886	.391300	.937017	.391285	.936149
5.0	.390645	.937111	.390630	.936242	.390614	.935374	.390599	.934506	.390583	.933638
5.2	.389943	.934597	.389927	.933730	.389912	.932862	.389896	.931995	.389880	.931128
5.4	.389240	.932084	.389224	.931217	.389208	.930350	.389191	.929484	.389175	.928618
5.6	.388536	.929570	.388519	.928704	.388502	.927839	.388486	.926973	.388469	.926108
5.8	.387830	.927057	.387813	.926192	.387796	.925327	.387779	.924463	.387762	.923599
6.0	.387123	.924544	.387105	.923679	.387088	.922816	.387071	.921952	.387053	.921089
6.2	.386414	.922030	.386397	.921167	.386379	.920304	.386361	.919442	.386343	.918579
6.4	.385705	.919517	.385686	.918655	.385668	.917793	.385650	.916931	.385632	.916070
6.6	.384993	.917004	.384975	.916143	.384956	.915282	.384938	.914421	.384919	.913561
6.8	.384281	.914492	.384262	.913631	.384243	.912771	.384224	.911911	.384205	.911051
7.0	.383567	.911979	.383548	.911119	.383528	.910260	.383509	.909401	.383490	.908542
7.2	.382852	.909466	.382832	.908607	.382812	.907749	.382793	.906891	.382773	.906033
7.4	.382135	.906954	.382115	.906096	.382095	.905238	.382075	.904381	.382055	.903524
7.6	.381417	.904441	.381397	.903584	.381376	.902728	.381356	.901871	.381335	.901015
7.8	.380698	.901929	.380677	.901073	.380656	.900217	.380635	.899362	.380614	.898507
8.0	.379978	.899417	.379956	.898561	.379935	.897707	.379913	.896852	.379892	.895998
8.2	.379255	.896904	.379234	.896050	.379212	.895196	.379190	.894343	.379168	.893489
8.4	.378532	.894392	.378510	.893539	.378488	.892686	.378465	.891833	.378443	.890981
8.6	.377807	.891880	.377785	.891028	.377762	.890176	.377739	.889324	.377717	.888472
8.8	.377081	.889368	.377058	.888517	.377035	.887665	.377012	.886815	.376989	.885964
9.0	.376353	.886856	.376330	.886006	.376306	.885155	.376283	.884305	.376259	.883456
9.2	.375624	.884345	.375600	.883495	.375577	.882645	.375553	.881796	.375529	.880947
9.4	.374894	.881833	.374870	.880984	.374845	.880135	.374821	.879287	.374797	.878439
9.6	.374162	.879321	.374137	.878473	.374113	.877625	.374088	.876778	.374063	.875931
9.8	.373429	.876809	.373404	.875962	.373379	.875116	.373353	.874269	.373328	.873423
10.0	.372694	.874298	.372669	.873452	.372643	.872606	.372617	.871760	.372592	.870915
10.2	.371958	.871786	.371932	.870941	.371906	.870096	.371880	.869252	.371854	.868407
10.4	.371221	.869275	.371194	.868431	.371168	.867587	.371141	.866743	.371115	.865899
10.6	.370482	.866763	.370455	.865920	.370428	.865077	.370401	.864234	.370374	.863392
10.8	.369741	.864252	.369714	.863410	.369687	.862567	.369659	.861725	.369632	.860884
11.0	.368999	.861741	.368972	.860899	.368944	.860058	.368916	.859217	.368888	.858376
11.2	.368256	.859230	.368228	.858389	.368200	.857548	.368172	.856708	.368143	.855869
11.4	.367511	.856718	.367483	.855878	.367454	.855039	.367426	.854200	.367397	.853361
11.6	.366765	.854207	.366736	.853368	.366707	.852530	.366678	.851691	.366649	.850853
11.8	.366018	.851696	.365988	.850858	.365959	.850020	.365929	.849183	.365900	.848346
12.0	.365268	.849185	.365239	.848348	.365209	.847511	.365179	.846674	.365149	.845838
12.2	.364518	.846674	.364487	.845837	.364457	.845002	.364427	.844166	.364396	.843331
12.4	.363766	.844163	.363735	.843327	.363704	.842492	.363673	.841658	.363642	.840823
12.6	.363012	.841652	.362981	.840817	.362950	.839983	.362918	.839149	.362887	.838316
12.8	.362257	.839140	.362226	.838307	.362194	.837474	.362162	.836641	.362130	.835808
13.0	.361501	.836629	.361469	.835797	.361436	.834964	.361404	.834132	.361372	.833301
13.2	.360743	.834118	.360710	.833287	.360678	.832455	.360645	.831624	.360612	.830793
13.4	.359983	.831607	.359950	.830777	.359917	.829946	.359884	.829116	.359851	.828286
13.6	.359222	.829096	.359189	.828266	.359155	.827437	.359122	.826607	.359088	.825779
13.8	.358460	.826585	.358426	.825756	.358392	.824928	.358358	.824099	.358324	.823271
14.0	.357696	.824074	.357661	.823246	.357627	.822418	.357593	.821591	.357558	.820764
14.2	.356930	.821563	.356895	.820736	.356861	.819909	.356826	.819083	.356791	.818256
14.4	.356163	.819052	.356128	.818226	.356093	.817400	.356057	.816574	.356022	.815749
14.6	.355395	.816541	.355359	.815716	.355323	.814891	.355287	.814066	.355251	.813241
14.8	.354625	.814030	.354588	.813206	.354552	.812381	.354516	.811557	.354479	.810734
15.0	.353853	.811519	.353816	.810695	.353780	.809872	.353743	.809049	.353706	.808226
15.2	.353080	.809008	.353043	.808185	.353005	.807363	.352968	.806541	.352931	.805719
15.4	.352305	.806497	.352267	.805675	.352230	.804853	.352192	.804032	.352154	.803211
15.6	.351529	.803986	.351491	.803165	.351453	.802344	.351414	.801524	.351376	.800704
15.8	.350751	.801474	.350712	.800654	.350674	.799835	.350635	.799015	.350596	.798196
16.0	.349972	.798963	.349933	.798144	.349894	.797325	.349854	.796507	.349815	.795688
16.2	.349191	.796452	.349151	.795634	.349112	.794816	.349072	.793998	.349032	.793181
16.4	.348408	.793941	.348368	.793123	.348328	.792306	.348288	.791489	.348248	.790673
16.6	.347624	.791429	.347584	.790613	.347543	.789796	.347502	.788981	.347462	.788165
16.8	.346838	.788918	.346798	.788102	.346756	.787287	.346715	.786472	.346674	.785657
17.0	.346051	.786406	.346010	.785592	.345968	.784777	.345927	.783963	.345885	.783149
17.2	.345262	.783895	.345220	.783081	.345178	.782267	.345136	.781454	.345094	.780641
17.4	.344472	.781383	.344430	.780570	.344387	.779758	.344344	.778945	.344302	.778133
17.6	.343680	.778871	.343637	.778059	.343594	.777248	.343551	.776436	.343508	.775625
17.8	.342886	.776360	.342843	.775548	.342799	.774738	.342756	.773927	.342712	.773117
18.0	.342091	.773848	.342047	.773038	.342003	.772228	.341959	.771418	.341915	.770609
18.2	.341294	.771336	.341250	.770526	.341205	.769717	.341161	.768909	.341116	.768100
18.4	.340496	.768824	.340451	.768015	.340406	.767207	.340361	.766399	.340316	.765592
18.6	.339696	.766312	.339650	.765504	.339605	.764697	.339559	.763890	.339513	.763083
18.8	.338894	.763800	.338848	.762993	.338802	.762187	.338756	.761381	.338710	.760575
19.0	.338090	.761287	.338044	.760481	.337997	.759676	.337951	.758871	.337904	.758066
19.2	.337285	.758775	.337238	.757970	.337191	.757165	.337144	.756361	.337097	.755557
19.4	.336479	.756262	.336431	.755458	.336384	.754655	.336336	.753851	.336288	.753048
19.6	.335670	.753750	.335622	.752947	.335574	.752144	.335526	.751341	.335478	.750539
19.8	.334860	.751237	.334812	.750435	.334763	.749633	.334715	.748831	.334666	.748030

FOR WELL OR AVERAGE WELL; WITH "n"=.85 AND DELIVERABILITY STANDARD PRESSURE EQUAL TO 80% OF FIELD AV. SIWHP (PSIG)
COL.1. IS RELATION OF COMPANY STATE DELIVERABILITY TO COMPANY OPEN FLOW AT COMPANY AV. PRESSURE
COL.2. IS RELATION OF COMPANY STATE DELIVERABILITY TO COMPANY STANDARD DELIVERABILITY AT 388, PSIA
WHEN COMPANY AV. PRESSURE VARIES FROM FIELD AV. PRESSURE AS INDICATED.

VARIATION COMPANY AVERAGE PRESSURE	388.0		387.8		387.6		387.4		387.2	
	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)
20.0-	.334049	.748724	.334000	.747923	.333951	.747122	.333901	.746321	.333852	.745521
20.2-	.333295	.746211	.333186	.745411	.333136	.744611	.333086	.743811	.333037	.743012
20.4-	.332420	.743698	.332370	.742899	.332320	.742099	.332270	.741301	.332220	.740502
20.6-	.331603	.741185	.331553	.740386	.331502	.739588	.331452	.738790	.331401	.737992
20.8-	.330785	.738672	.330734	.737874	.330683	.737076	.330632	.736279	.330580	.735483
21.0-	.329965	.736158	.329913	.735361	.329862	.734565	.329810	.733769	.329758	.732975
21.2-	.329145	.733645	.329091	.732849	.329039	.732053	.328987	.731258	.328934	.730468
21.4-	.328320	.731131	.328267	.730336	.328214	.729541	.328161	.728746	.328109	.727952
21.6-	.327494	.728617	.327441	.727823	.327388	.727029	.327335	.726235	.327281	.725442
21.8-	.326667	.726103	.326614	.725309	.326560	.724516	.326506	.723724	.326452	.722931
22.0-	.325839	.723588	.325784	.722796	.325730	.722004	.325676	.721212	.325621	.720421
22.2-	.325008	.721074	.324953	.720282	.324899	.719491	.324844	.718700	.324789	.717910
22.4-	.324176	.718559	.324121	.717769	.324065	.716978	.324010	.716188	.323954	.715399
22.6-	.323342	.716045	.323286	.715255	.323230	.714465	.323174	.713676	.323118	.712888
22.8-	.322507	.713530	.322450	.712741	.322394	.711952	.322337	.711164	.322280	.710376
23.0-	.321669	.711015	.321612	.710227	.321555	.709439	.321498	.708652	.321441	.707864
23.2-	.320830	.708499	.320772	.707712	.320715	.706925	.320657	.706139	.320600	.705353
23.4-	.319989	.705984	.319931	.705197	.319873	.704411	.319815	.703626	.319756	.702841
23.6-	.319146	.703468	.319088	.702682	.319029	.701897	.318970	.701113	.318911	.700328
23.8-	.318302	.700952	.318243	.700167	.318183	.699383	.318124	.698599	.318065	.697816
24.0-	.317456	.698436	.317396	.697652	.317336	.696869	.317276	.696086	.317216	.695303
24.2-	.316607	.695919	.316547	.695137	.316487	.694354	.316426	.693572	.316366	.692791
24.4-	.315758	.693403	.315697	.692621	.315636	.691839	.315575	.691058	.315514	.690278
24.6-	.314906	.690886	.314844	.690105	.314783	.689324	.314721	.688544	.314660	.687764
24.8-	.314052	.688369	.313990	.687589	.313928	.686809	.313866	.686030	.313804	.685251
25.0-	.313197	.685851	.313135	.685072	.313072	.684293	.313009	.683515	.312946	.682737
25.2-	.312340	.683334	.312277	.682556	.312214	.681778	.312150	.681000	.312087	.680223
25.4-	.311481	.680816	.311417	.680039	.311353	.679262	.311290	.678485	.311226	.677709
25.6-	.310620	.678298	.310556	.677522	.310491	.676745	.310427	.675970	.310362	.675194
25.8-	.309757	.675780	.309693	.675004	.309628	.674229	.309563	.673454	.309497	.672679
26.0-	.308893	.673261	.308827	.672486	.308762	.671712	.308696	.670938	.308631	.670164
26.2-	.308026	.670742	.307960	.669968	.307894	.669195	.307828	.668422	.307762	.667649
26.4-	.307158	.668223	.307092	.667450	.307025	.666678	.306958	.665905	.306891	.665133
26.6-	.306288	.665704	.306221	.664932	.306154	.664160	.306086	.663388	.306019	.662617
26.8-	.305416	.663184	.305348	.662413	.305280	.661642	.305212	.660871	.305144	.660101
27.0-	.304542	.660664	.304474	.659894	.304405	.659124	.304337	.658356	.304268	.657585
27.2-	.303666	.658144	.303597	.657376	.303528	.656605	.303459	.655836	.303390	.655068
27.4-	.302789	.655623	.302719	.654855	.302649	.654086	.302579	.653318	.302510	.652551
27.6-	.301909	.653102	.301839	.652334	.301768	.651567	.301698	.650800	.301628	.650033
27.8-	.301027	.650581	.300957	.649814	.300886	.649048	.300815	.648283	.300744	.647516
28.0-	.300144	.648059	.300072	.647293	.300001	.646528	.299929	.645762	.299858	.644998
28.2-	.299258	.645537	.299186	.644772	.299114	.644008	.299042	.643243	.298970	.642479
28.4-	.298371	.643015	.298298	.642251	.298226	.641487	.298153	.640724	.298080	.639960
28.6-	.297482	.640493	.297409	.639729	.297335	.638966	.297262	.638204	.297188	.637441
28.8-	.296591	.637970	.296517	.637207	.296443	.636445	.296369	.635683	.296295	.634922
29.0-	.295697	.635446	.295623	.634685	.295548	.633924	.295474	.633163	.295399	.632402
29.2-	.294802	.632923	.294727	.632162	.294652	.631402	.294577	.630642	.294501	.629882
29.4-	.293905	.630399	.293829	.629639	.293753	.628879	.293677	.628120	.293601	.627361
29.6-	.293006	.627874	.292929	.627115	.292853	.626357	.292776	.625598	.292700	.624840
29.8-	.292105	.625350	.292028	.624591	.291951	.623834	.291873	.623076	.291796	.622319
30.0-	.291201	.622824	.291124	.622067	.291046	.621310	.290968	.620554	.290890	.619797
30.2-	.290296	.620299	.290218	.619542	.290140	.618786	.290061	.618031	.289983	.617275
30.4-	.289389	.617773	.289310	.617017	.289231	.616262	.289152	.615507	.289073	.614753
30.6-	.288480	.615247	.288400	.614492	.288321	.613738	.288241	.612984	.288161	.612230
30.8-	.287569	.612720	.287488	.611966	.287408	.611212	.287328	.610459	.287247	.609707
31.0-	.286655	.610193	.286574	.609440	.286494	.608687	.286413	.607935	.286331	.607183
31.2-	.285740	.607665	.285658	.606913	.285577	.606161	.285495	.605410	.285413	.604659
31.4-	.284823	.605137	.284740	.604386	.284658	.603635	.284576	.602884	.284493	.602134
31.6-	.283903	.602608	.283820	.601858	.283737	.601108	.283654	.600358	.283571	.599609
31.8-	.282982	.600079	.282898	.599330	.282815	.598581	.282731	.597832	.282647	.597083
32.0-	.282058	.597550	.281974	.596801	.281890	.596053	.281805	.595305	.281721	.594557
32.2-	.281132	.595020	.281047	.594272	.280963	.593525	.280878	.592778	.280792	.592031
32.4-	.280204	.592489	.280119	.591743	.280033	.590996	.279948	.590250	.279862	.589504
32.6-	.279274	.589959	.279188	.589213	.279102	.588467	.279016	.587722	.278929	.586977
32.8-	.278342	.587427	.278256	.586682	.278169	.585937	.278082	.585193	.277995	.584449
33.0-	.277408	.584895	.277321	.584151	.277233	.583407	.277145	.582663	.277058	.581920
33.2-	.276472	.582363	.276384	.581620	.276295	.580876	.276207	.580134	.276119	.579391
33.4-	.275533	.579830	.275445	.579088	.275356	.578345	.275267	.577603	.275177	.576862
33.6-	.274593	.577297	.274503	.576555	.274414	.575814	.274324	.575073	.274234	.574332
33.8-	.273650	.574763	.273560	.574022	.273469	.573281	.273379	.572541	.273288	.571801
34.0-	.272705	.572228	.272614	.571488	.272523	.570749	.272432	.570009	.272341	.569270
34.2-	.271758	.569693	.271666	.568954	.271575	.568215	.271483	.567477	.271391	.566739
34.4-	.270808	.567158	.270716	.566419	.270624	.565681	.270531	.564944	.270439	.564206
34.6-	.269857	.564621	.269764	.563884	.269671	.563147	.269578	.562410	.269484	.561674
34.8-	.268903	.562085	.268809	.561348	.268716	.560612	.268622	.559876	.268528	.559140
35.0-	.267947	.559547	.267853	.558812	.267758	.558076	.267664	.557341	.267569	.556606
35.2-	.266989	.557010	.266894	.556275	.266799	.555540	.266703	.554806	.266608	.554072
35.4-	.266029	.554471	.265933	.553737	.265837	.553003	.265741	.552270	.265645	.551537
35.6-	.265066	.551932	.264969	.551199	.264873	.550466	.264776	.549733	.264679	.549001
35.8-	.264101	.549392	.264004	.548660	.263906	.547928	.263809	.547196	.263711	.546465
36.0-	.263134	.546852	.263036	.546120	.262938	.545389	.262839	.544658	.262741	.543928
36.2-	.262164	.544311	.262065	.543580	.261967	.542853	.261868	.542120	.261769	.541390
36.4-	.261192	.541769	.261093	.541039	.260993	.540310	.260894	.539581	.260794	.538852
36.6-	.260218	.539227	.260118	.538498	.260018	.537769	.259917	.537041	.259817	.536313
36.8-	.259242	.536684	.259141	.535956	.259040	.535228	.258939	.534500	.258837	.533773
37.0-	.258263	.534140	.258161	.533413	.258060	.532686	.257958	.531959	.257856	.531233
37.2-	.257282	.531596	.257180	.530869	.257077	.530143	.256974	.529417	.256872	.528692
37.4-	.256299	.529051	.256196	.528325	.256092	.527600	.255989	.526875	.255885	.526150
37.6-	.255313	.526505	.255209	.525780	.255105	.525056	.255001	.524332	.254897	.523608
37.8-	.254325	.523958	.254220	.523234	.254115	.522511	.254010	.521788	.253905	.521065
38.0-	.253334	.521411	.253229	.520688	.253123	.519965	.253018	.519243	.252912	.518521
38.2-	.252341	.518863	.252235	.518141	.252129	.517419	.252023	.516697	.251916	.515976
38.4-	.251346	.516315	.251239	.515593	.251132	.514872	.251025	.514151	.250918	.513431
38.6-	.250349	.513765	.250241	.513044	.250133	.512324	.250025	.511604	.249917	.510885
38.8-	.249348	.511215	.249240	.510495	.249131	.509776	.249023	.509056	.248914	.508338
39.0-	.248346	.508664	.248237	.507945	.248127	.507226	.248018	.506508	.247908	.505790
39.2-	.247341	.506112	.247231	.505394	.247121	.504676	.247010	.503959	.246900	.503241
39.4-	.246333	.503559	.246223	.502842	.246112	.502125	.246001	.501408	.245889	.500692
39.6-	.245324	.501006	.245212	.500289	.245100	.499573	.244988	.498857	.244876	.498142
39.8-	.244311	.498452	.244199	.497736	.244086	.497021	.243974	.496306	.243861	.495591
40.0-	.243296	.495897	.243183	.495182	.243070	.494467	.242956	.493753	.242843	.493039

FOR WELL OR AVERAGE WELL, WITH "n"=.85 AND DELIVERABILITY STANDARD PRESSURE EQUAL TO 80% OF FIELD AV. SIWP (PSIG)
COL. 1 IS RELATION OF COMPANY STATE DELIVERABILITY TO COMPANY OPEN FLOW AT COMPANY AV. PRESSURE
COL. 2 IS RELATION OF COMPANY STATE DELIVERABILITY TO COMPANY STANDARD DELIVERABILITY AT 388, PSIA
WHEN COMPANY AV. PRESSURE VARIES FROM FIELD AV. PRESSURE AS INDICATED

RELATION COMPANY AVERAGE PRESSURE	388.0		387.8		387.6		387.4		387.2	
	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)
.0	.407770	1.000000	.407764	.999109	.407758	.998218	.407751	.997327	.407745	.996437
.2	.408439	1.002518	.408433	1.001626	.408427	1.000734	.408421	.999842	.408415	.998951
.4	.409106	1.005036	.409101	1.004143	.409095	1.003250	.409090	1.002358	.409084	1.001466
.6	.409772	1.007554	.409767	1.006660	.409762	1.005766	.409757	1.004873	.409752	1.003980
.8	.410437	1.010072	.410432	1.009177	.410428	1.008283	.410423	1.007388	.410418	1.006495
1.0	.411101	1.012590	.411097	1.011694	.411092	1.010799	.411088	1.009904	.411083	1.009009
1.2	.411766	1.015109	.411759	1.014212	.411755	1.013316	.411751	1.012420	.411747	1.011524
1.4	.412425	1.017627	.412421	1.016730	.412417	1.015833	.412414	1.014936	.412410	1.014039
1.6	.413085	1.020146	.413082	1.019248	.413078	1.018350	.413075	1.017452	.413072	1.016555
1.8	.413744	1.022666	.413741	1.021766	.413738	1.020867	.413735	1.019969	.413732	1.019070
2.0	.414402	1.025185	.414399	1.024285	.414396	1.023385	.414394	1.022485	.414391	1.021586
2.2	.415058	1.027704	.415056	1.026803	.415054	1.025903	.415051	1.025002	.415049	1.024102
2.4	.415714	1.030224	.415712	1.029322	.415710	1.028420	.415708	1.027519	.415706	1.026618
2.6	.416368	1.032744	.416366	1.031841	.416364	1.030939	.416363	1.030036	.416361	1.029134
2.8	.417021	1.035264	.417019	1.034361	.417018	1.033457	.417017	1.032554	.417015	1.031651
3.0	.417673	1.037785	.417672	1.036880	.417671	1.035976	.417670	1.035071	.417669	1.034168
3.2	.418323	1.040305	.418323	1.039400	.418322	1.038494	.418321	1.037589	.418321	1.036685
3.4	.418973	1.042826	.418972	1.041920	.418972	1.041013	.418972	1.040107	.418971	1.039202
3.6	.419621	1.045347	.419621	1.044440	.419621	1.043533	.419621	1.042626	.419621	1.041719
3.8	.420268	1.047868	.420268	1.046960	.420269	1.046052	.420269	1.045144	.420269	1.044237
4.0	.420914	1.050390	.420915	1.049481	.420915	1.048572	.420916	1.047663	.420917	1.046755
4.2	.421559	1.052911	.421560	1.052001	.421561	1.051092	.421562	1.050182	.421563	1.049273
4.4	.422202	1.055433	.422204	1.054522	.422205	1.053612	.422206	1.052701	.422208	1.051791
4.6	.422845	1.057955	.422847	1.057044	.422848	1.056132	.422850	1.055221	.422851	1.054310
4.8	.423486	1.060478	.423488	1.059565	.423490	1.058652	.423492	1.057740	.423494	1.056828
5.0	.424126	1.063000	.424129	1.062087	.424131	1.061173	.424133	1.060260	.424136	1.059347
5.2	.424765	1.065523	.424768	1.064609	.424771	1.063694	.424773	1.062780	.424776	1.061867
5.4	.425403	1.068046	.425406	1.067131	.425409	1.066215	.425412	1.065301	.425415	1.064386
5.6	.426040	1.070569	.426043	1.069653	.426047	1.068737	.426050	1.067821	.426053	1.066906
5.8	.426676	1.073093	.426679	1.072176	.426683	1.071259	.426686	1.070342	.426690	1.069425
6.0	.427310	1.075617	.427314	1.074698	.427318	1.073781	.427322	1.072863	.427326	1.071946
6.2	.427943	1.078141	.427948	1.077222	.427952	1.076303	.427956	1.075384	.427960	1.074466
6.4	.428576	1.080665	.428580	1.079745	.428585	1.078825	.428589	1.077906	.428594	1.076987
6.6	.429207	1.083189	.429212	1.082268	.429216	1.081348	.429221	1.080427	.429226	1.079507
6.8	.429837	1.085714	.429842	1.084792	.429847	1.083871	.429852	1.082949	.429857	1.082028
7.0	.430465	1.088239	.430471	1.087316	.430476	1.086394	.430482	1.085472	.430487	1.084550
7.2	.431093	1.090764	.431099	1.089840	.431105	1.088917	.431111	1.087994	.431116	1.087071
7.4	.431720	1.093290	.431726	1.092365	.431732	1.091441	.431738	1.090517	.431744	1.089593
7.6	.432345	1.095815	.432352	1.094890	.432358	1.093965	.432364	1.093040	.432371	1.092115
7.8	.432970	1.098341	.432976	1.097415	.432983	1.096489	.432990	1.095563	.432997	1.094638
8.0	.433593	1.100867	.433600	1.099940	.433607	1.099013	.433614	1.098086	.433621	1.097160
8.2	.434215	1.103394	.434222	1.102466	.434230	1.101538	.434237	1.100610	.434244	1.099683
8.4	.434836	1.105920	.434844	1.104991	.434851	1.104063	.434859	1.103134	.434867	1.102206
8.6	.435456	1.108447	.435464	1.107517	.435472	1.106588	.435480	1.105658	.435488	1.104729
8.8	.436075	1.110974	.436083	1.110044	.436092	1.109113	.436100	1.108183	.436108	1.107253
9.0	.436693	1.113502	.436701	1.112570	.436710	1.111639	.436719	1.110708	.436727	1.109777
9.2	.437310	1.116030	.437318	1.115097	.437327	1.114165	.437336	1.113233	.437345	1.112301
9.4	.437925	1.118558	.437934	1.117624	.437944	1.116691	.437953	1.115758	.437962	1.114825
9.6	.438540	1.121086	.438549	1.120151	.438559	1.119217	.438568	1.118283	.438578	1.117350
9.8	.439153	1.123614	.439163	1.122679	.439173	1.121744	.439182	1.120809	.439192	1.119875
10.0	.439766	1.126143	.439776	1.125207	.439786	1.124271	.439796	1.123335	.439806	1.122400
10.2	.440377	1.128672	.440387	1.127735	.440398	1.126798	.440408	1.125862	.440418	1.124925
10.4	.440987	1.131201	.440998	1.130263	.441009	1.129326	.441019	1.128388	.441030	1.127451
10.6	.441597	1.133731	.441607	1.132792	.441618	1.131853	.441629	1.130915	.441640	1.129977
10.8	.442205	1.136261	.442216	1.135321	.442227	1.134381	.442238	1.133442	.442249	1.132503
11.0	.442812	1.138791	.442823	1.137850	.442835	1.136910	.442846	1.135970	.442858	1.135030
11.2	.443418	1.141321	.443429	1.140380	.443441	1.139438	.443453	1.138497	.443465	1.137557
11.4	.444023	1.143852	.444035	1.142909	.444047	1.141967	.444059	1.141025	.444071	1.140084
11.6	.444627	1.146383	.444639	1.145440	.444651	1.144496	.444664	1.143554	.444676	1.142611
11.8	.445229	1.148914	.445242	1.147970	.445255	1.147026	.445267	1.146082	.445280	1.145139
12.0	.445831	1.151446	.445844	1.150500	.445857	1.149556	.445870	1.148611	.445883	1.147667
12.2	.446432	1.153978	.446445	1.153031	.446458	1.152086	.446472	1.151140	.446485	1.150195
12.4	.447032	1.156510	.447045	1.155563	.447059	1.154616	.447072	1.153669	.447086	1.152723
12.6	.447630	1.159042	.447644	1.158094	.447658	1.157146	.447672	1.156199	.447685	1.155252
12.8	.448228	1.161575	.448242	1.160626	.448256	1.159677	.448270	1.158729	.448284	1.157781
13.0	.448825	1.164108	.448839	1.163158	.448853	1.162208	.448868	1.161259	.448882	1.160310
13.2	.449420	1.166641	.449435	1.165690	.449449	1.164740	.449464	1.163790	.449479	1.162840
13.4	.450015	1.169174	.450030	1.168223	.450044	1.167272	.450059	1.166321	.450074	1.165370
13.6	.450608	1.171708	.450623	1.170756	.450639	1.169804	.450654	1.168852	.450669	1.167900
13.8	.451201	1.174242	.451216	1.173289	.451232	1.172336	.451247	1.171383	.451262	1.170431
14.0	.451792	1.176777	.451808	1.175822	.451824	1.174869	.451839	1.173915	.451855	1.172962
14.2	.452383	1.179311	.452399	1.178356	.452415	1.177401	.452431	1.176447	.452447	1.175493
14.4	.452972	1.181846	.452988	1.180890	.453005	1.179935	.453021	1.178979	.453037	1.178024
14.6	.453560	1.184382	.453577	1.183425	.453594	1.182468	.453610	1.181512	.453627	1.180556
14.8	.454148	1.186917	.454165	1.185959	.454181	1.185002	.454198	1.184045	.454215	1.183088
15.0	.454734	1.189453	.454751	1.188494	.454768	1.187536	.454786	1.186578	.454803	1.185620
15.2	.455320	1.191989	.455337	1.191030	.455354	1.190070	.455372	1.189111	.455389	1.188153
15.4	.455904	1.194526	.455922	1.193565	.455939	1.192605	.455957	1.191645	.455975	1.190686
15.6	.456487	1.197063	.456505	1.196101	.456523	1.195140	.456541	1.194179	.456559	1.193219
15.8	.457070	1.199600	.457088	1.198638	.457106	1.197676	.457124	1.196714	.457143	1.195752
16.0	.457651	1.202137	.457670	1.201174	.457688	1.200211	.457707	1.199249	.457725	1.198286
16.2	.458232	1.204675	.458250	1.203711	.458269	1.202747	.458288	1.201784	.458306	1.200820
16.4	.458811	1.207213	.458830	1.206248	.458849	1.205283	.458868	1.204319	.458887	1.203355
16.6	.459390	1.209752	.459409	1.208786	.459428	1.207820	.459447	1.206855	.459466	1.205890
16.8	.459967	1.212290	.459986	1.211323	.460006	1.210357	.460025	1.209391	.460045	1.208425
17.0	.460543	1.214829	.460563	1.213861	.460583	1.212894	.460603	1.211927	.460622	1.210960
17.2	.461119	1.217369	.461139	1.216400	.461159	1.215432	.461179	1.214464	.461199	1.213496
17.4	.461693	1.219908	.461714	1.218939	.461734	1.217969	.461754	1.217001	.461774	1.216032
17.6	.462267	1.222448	.462287	1.221478	.462308	1.220508	.462328	1.219538	.462349	1.218568
17.8	.462840	1.224988	.462860	1.224017	.462881	1.223046	.462902	1.222075	.462923	1.221105
18.0	.463411	1.227529	.463432	1.226557	.463453	1.225585	.463474	1.224613	.463495	1.223642
18.2	.463982	1.230070	.464003	1.229097	.464024	1.228124	.464046	1.227152	.464067	1.226179
18.4	.464551	1.232611	.464573	1.231637	.464594	1.230664	.464616	1.229690	.464638	1.228717
18.6	.465120	1.235153	.465142	1.234178	.465164	1.233203	.465185	1.232229	.465207	1.231255
18.8	.465688	1.237695	.465710	1.236719	.465732	1.235743	.465754	1.234768	.465776	1.233793
19.0	.466255	1.240237	.466277	1.239260	.466299	1.238284	.466321	1.237308	.466344	1.236332
19.2	.466820	1.242779	.466843	1.241802	.466865	1.240825	.466888	1.239848	.466911	1.238871
19.4	.467385	1.245322	.467408	1.244344	.467431	1.243366	.467454	1.242388	.467476	1.241410
19.6	.467949	1.247866	.467972	1.246886	.467995	1.245907	.468018	1.244928	.468041	1.243950
19.8	.468512	1.250409	.468535	1.249429	.468559	1.248449	.468582	1.247469	.468605	1.246490

FOR WELL OR AVERAGE WELL; WITH "n"=.85 AND DELIVERABILITY STANDARD PRESSURE EQUAL TO 80% OF FIELD AV SIWHP (PSIG)
COL.1 IS RELATION OF COMPANY STATE DELIVERABILITY TO COMPANY OPEN FLOW AT COMPANY AV PRESSURE
COL.2. IS RELATION OF COMPANY STATE DELIVERABILITY TO COMPANY STANDARD DELIVERABILITY AT 388. PSIA
WHEN COMPANY AV. PRESSURE VARIES FROM FIELD AV PRESSURE AS INDICATED.

VARIATION COMPANY AVERAGE PRESSURE	388.0		387.8		387.6		387.4		387.2	
	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)
20.0	.469074	1.252953	.469098	1.251972	.469121	1.250991	.469145	1.250010	.469168	1.249030
20.2	.469635	1.255497	.469659	1.254515	.469681	1.253533	.469707	1.252552	.469730	1.251571
20.4	.470195	1.258042	.470219	1.257059	.470243	1.256076	.470267	1.255094	.470291	1.254112
20.6	.470756	1.260587	.470779	1.259603	.470803	1.258619	.470827	1.257636	.470852	1.256653
20.8	.471313	1.263132	.471337	1.262147	.471362	1.261163	.471386	1.260179	.471411	1.259195
21.0	.471870	1.265677	.471895	1.264692	.471920	1.263707	.471944	1.262722	.471969	1.261937
21.2	.472426	1.268223	.472451	1.267237	.472476	1.266251	.472501	1.265265	.472527	1.264279
21.4	.472982	1.270770	.473007	1.269782	.473032	1.268795	.473058	1.267808	.473083	1.266822
21.6	.473536	1.273316	.473562	1.272328	.473587	1.271340	.473613	1.270352	.473638	1.269365
21.8	.474090	1.275863	.474116	1.274874	.474141	1.273885	.474167	1.272896	.474193	1.271908
22.0	.474643	1.278411	.474669	1.277420	.474695	1.276431	.474721	1.275441	.474747	1.274452
22.2	.475194	1.280958	.475221	1.279967	.475247	1.278976	.475273	1.277986	.475299	1.276996
22.4	.475745	1.283506	.475772	1.282514	.475798	1.281523	.475825	1.280531	.475851	1.279540
22.6	.476295	1.286054	.476322	1.285062	.476348	1.284069	.476375	1.283077	.476402	1.282085
22.8	.476844	1.288603	.476871	1.287609	.476898	1.286616	.476925	1.285623	.476952	1.284630
23.0	.477392	1.291152	.477419	1.290158	.477446	1.289163	.477474	1.288169	.477501	1.287176
23.2	.477939	1.293702	.477967	1.292706	.477994	1.291711	.478022	1.290716	.478049	1.289722
23.4	.478486	1.296251	.478513	1.295255	.478541	1.294259	.478569	1.293263	.478596	1.292268
23.6	.479031	1.298801	.479059	1.297804	.479087	1.296807	.479115	1.295811	.479143	1.294814
23.8	.479575	1.301352	.479604	1.300354	.479632	1.299356	.479660	1.298358	.479688	1.297361
24.0	.480119	1.303903	.480147	1.302904	.480176	1.301905	.480204	1.300906	.480232	1.299908
24.2	.480662	1.306454	.480690	1.305454	.480719	1.304454	.480747	1.303455	.480776	1.302456
24.4	.481203	1.309005	.481232	1.308005	.481261	1.307004	.481290	1.306004	.481319	1.305004
24.6	.481744	1.311557	.481773	1.310556	.481802	1.309554	.481831	1.308553	.481860	1.307552
24.8	.482284	1.314109	.482313	1.313107	.482343	1.312105	.482372	1.311103	.482401	1.310101
25.0	.482823	1.316662	.482853	1.315659	.482882	1.314655	.482912	1.313653	.482941	1.312650
25.2	.483362	1.319215	.483391	1.318211	.483421	1.317207	.483451	1.316203	.483480	1.315199
25.4	.483899	1.321768	.483929	1.320763	.483959	1.319758	.483989	1.318753	.484019	1.317749
25.6	.484435	1.324322	.484465	1.323316	.484496	1.322310	.484526	1.321304	.484556	1.320299
25.8	.484971	1.326876	.485001	1.325869	.485031	1.324862	.485062	1.323856	.485092	1.322850
26.0	.485505	1.329431	.485536	1.328423	.485567	1.327415	.485597	1.326408	.485628	1.325401
26.2	.486039	1.331985	.486070	1.330977	.486101	1.329968	.486132	1.328960	.486163	1.327952
26.4	.486572	1.334541	.486603	1.333531	.486634	1.332521	.486665	1.331512	.486696	1.330503
26.6	.487104	1.337096	.487135	1.336085	.487167	1.335075	.487198	1.334065	.487229	1.333055
26.8	.487635	1.339652	.487667	1.338640	.487698	1.337629	.487730	1.336618	.487761	1.335608
27.0	.488166	1.342208	.488197	1.341196	.488229	1.340184	.488261	1.339172	.488292	1.338160
27.2	.488695	1.344765	.488727	1.343752	.488759	1.342739	.488791	1.341726	.488823	1.340714
27.4	.489224	1.347322	.489256	1.346308	.489288	1.345294	.489320	1.344280	.489352	1.343267
27.6	.489751	1.349879	.489784	1.348864	.489816	1.347849	.489848	1.346835	.489881	1.345821
27.8	.490278	1.352437	.490311	1.351421	.490343	1.350405	.490376	1.349390	.490408	1.348375
28.0	.490804	1.354995	.490837	1.353978	.490870	1.352962	.490902	1.351946	.490935	1.350930
28.2	.491329	1.357554	.491362	1.356536	.491395	1.355519	.491428	1.354501	.491461	1.353485
28.4	.491853	1.360113	.491887	1.359094	.491920	1.358076	.491953	1.357058	.491986	1.356040
28.6	.492377	1.362672	.492410	1.361652	.492444	1.360633	.492477	1.359614	.492511	1.358596
28.8	.492899	1.365232	.492933	1.364211	.492967	1.363191	.493000	1.362171	.493034	1.361152
29.0	.493421	1.367792	.493455	1.366770	.493489	1.365749	.493523	1.364729	.493557	1.363708
29.2	.493942	1.370352	.493976	1.369330	.494010	1.368308	.494044	1.367286	.494078	1.366265
29.4	.494462	1.372913	.494496	1.371890	.494531	1.370867	.494565	1.369845	.494599	1.368822
29.6	.494981	1.375474	.495016	1.374450	.495050	1.373427	.495085	1.372403	.495119	1.371380
29.8	.495499	1.378036	.495534	1.377011	.495569	1.375986	.495604	1.374962	.495638	1.373938
30.0	.496017	1.380598	.496052	1.379572	.496087	1.378547	.496122	1.377521	.496157	1.376496
30.2	.496534	1.383160	.496569	1.382133	.496604	1.381107	.496639	1.380081	.496674	1.379055
30.4	.497049	1.385723	.497085	1.384695	.497120	1.383668	.497155	1.382641	.497191	1.381614
30.6	.497564	1.388286	.497600	1.387258	.497635	1.386229	.497671	1.385202	.497707	1.384174
30.8	.498079	1.390850	.498114	1.389820	.498150	1.388791	.498186	1.387762	.498222	1.386734
31.0	.498592	1.393413	.498628	1.392383	.498664	1.391353	.498700	1.390324	.498736	1.389294
31.2	.499104	1.395978	.499140	1.394947	.499177	1.393916	.499213	1.392885	.499249	1.391855
31.4	.499616	1.398543	.499652	1.397510	.499689	1.396479	.499725	1.395447	.499761	1.394416
31.6	.500127	1.401108	.500163	1.400075	.500200	1.399042	.500237	1.398010	.500273	1.396978
31.8	.500637	1.403673	.500674	1.402639	.500710	1.401606	.500747	1.400573	.500784	1.399540
32.0	.501146	1.406239	.501183	1.405204	.501220	1.404170	.501257	1.403136	.501294	1.402102
32.2	.501655	1.408805	.501692	1.407770	.501729	1.406734	.501766	1.405699	.501803	1.404665
32.4	.502162	1.411372	.502199	1.410335	.502237	1.409299	.502274	1.408263	.502312	1.407228
32.6	.502669	1.413939	.502706	1.412902	.502744	1.411865	.502781	1.410828	.502819	1.409791
32.8	.503175	1.416506	.503213	1.415468	.503250	1.414430	.503288	1.413393	.503326	1.412355
33.0	.503680	1.419074	.503718	1.418035	.503756	1.416996	.503794	1.415958	.503832	1.414920
33.2	.504184	1.421643	.504222	1.420603	.504260	1.419563	.504299	1.418524	.504337	1.417484
33.4	.504688	1.424211	.504726	1.423170	.504764	1.422130	.504803	1.421089	.504841	1.420050
33.6	.505190	1.426780	.505229	1.425739	.505268	1.424697	.505306	1.423656	.505345	1.422615
33.8	.505692	1.429350	.505731	1.428307	.505770	1.427265	.505809	1.426223	.505847	1.425181
34.0	.506193	1.431920	.506232	1.430876	.506271	1.429833	.506310	1.428790	.506349	1.427747
34.2	.506694	1.434490	.506733	1.433446	.506772	1.432401	.506811	1.431358	.506850	1.430314
34.4	.507193	1.437061	.507233	1.436015	.507272	1.434970	.507311	1.433926	.507351	1.432881
34.6	.507692	1.439632	.507731	1.438586	.507771	1.437540	.507811	1.436494	.507850	1.435449
34.8	.508190	1.442203	.508230	1.441156	.508269	1.440109	.508309	1.439063	.508349	1.438017
35.0	.508687	1.444775	.508727	1.443727	.508767	1.442680	.508807	1.441632	.508847	1.440585
35.2	.509183	1.447348	.509223	1.446299	.509264	1.445250	.509304	1.444202	.509344	1.443154
35.4	.509679	1.449920	.509719	1.448870	.509759	1.447821	.509800	1.446772	.509840	1.445723
35.6	.510174	1.452493	.510214	1.451443	.510255	1.450392	.510295	1.449342	.510336	1.448293
35.8	.510668	1.455067	.510708	1.454015	.510749	1.452964	.510790	1.451913	.510830	1.450863
36.0	.511161	1.457641	.511202	1.456588	.511243	1.455536	.511283	1.454484	.511324	1.453433
36.2	.511653	1.460215	.511694	1.459162	.511735	1.458109	.511776	1.457056	.511817	1.456004
36.4	.512145	1.462790	.512186	1.461736	.512227	1.460682	.512269	1.459628	.512310	1.458575
36.6	.512636	1.465365	.512677	1.464310	.512719	1.463255	.512760	1.462201	.512801	1.461147
36.8	.513126	1.467941	.513167	1.466885	.513209	1.465829	.513251	1.464774	.513292	1.463719
37.0	.513615	1.470517	.513657	1.469460	.513699	1.468404	.513740	1.467347	.513782	1.466291
37.2	.514104	1.473093	.514146	1.472036	.514188	1.470978	.514230	1.469921	.514272	1.468864
37.4	.514592	1.475670	.514634	1.474612	.514676	1.473553	.514718	1.472495	.514760	1.471437
37.6	.515079	1.478247	.515121	1.477188	.515163	1.476129	.515205	1.475070	.515248	1.474011
37.8	.515565	1.480825	.515607	1.479765	.515650	1.478705	.515692	1.477645	.515735	1.476585
38.0	.516050	1.483403	.516093	1.482342	.516136	1.481281	.516178	1.480220	.516221	1.479160
38.2	.516535	1.485982	.516578	1.484920	.516621	1.483858	.516663	1.482796	.516706	1.481735
38.4	.517019	1.488561	.517062	1.487498	.517105	1.486435	.517148	1.485373	.517191	1.484310
38.6	.517502	1.491140	.517545	1.490076	.517588	1.489013	.517632	1.487949	.517675	1.486886
38.8	.517984	1.493720	.518028	1.492655	.518071	1.491591	.518115	1.490526	.518158	1.489462
39.0	.518466	1.496300	.518510	1.495235	.518553	1.494169	.518597	1.493104	.518640	1.492039
39.2	.518947	1.498881	.518991	1.497814	.519034	1.496748	.519078	1.495682	.519122	1.494616
39.4	.519427	1.501462	.519471	1.500394	.519515	1.499327	.519559	1.498260	.519603	1.497194
39.6	.519907	1.504043	.519951	1.502975	.519995	1.501907	.520039	1.500839	.520083	1.499772
39.8	.520385	1.506625	.520429	1.505556	.520474	1.504487	.520518	1.503419	.520562	1.502350
40.0	.520863	1.509208	.520908	1.508138	.520952	1.507068	.520996	1.505998	.521041	1.504929

place after the decimal. Determination of factors (1) and (2) requires the solution of the following equations:

Answer No. 1

$$= \left[\frac{(FP + CV)^2 - .8\,[(FP - 14.4) + 14.4]^2}{(FP + CV)^2} \right]^{.85}$$

Answer No. 2

$$= \left[\frac{(FP + CV)^2 - 1.8\,(FP - 14.4) + 14.4]^2}{52399.64} \right]^{.85}$$

Field pressure (FP) starts at 388.0 psia and decreases by 0.2 psi increments to 80.0 psia; and for each field pressure (FP) the company variation in pressure (CV) increases by 0.2 psi increments from —40.0 to +40.0 psia. The (FP + CV) is equivalent to the company average shut-in wellhead pressure: 0.8 (FP — 14.4) is equivalent to the company state deliverability gauge pressure; 52399.64 is the difference between company average pressure squared and company state deliverability pressure squared when field average pressure and company average pressure are both equal to 388 psia.

The preceding equations are applicable only when the slope of the back pressure curve for the well or average well is 0.85 and the state deliverability is the rate of flow against a back pressure equal to 80 per cent of the shut-in wellhead gauge pressure.

The accuracy of results obtained from use of the table is within a relatively few thousandths of 1 per cent in the upper part of the pressure range covered by the table. And, it is within a relatively few hundredths of 1 per cent for the lower range of the results that would be found by use of other calculation procedures carrying all quantities to the seventh decimal place and using seven-place logarithms.

The program enabling the Burroughs 205 to solve the answers for the deliverability table consists of a series of instructions which simply tell the computer how to solve the equations just discussed. This program contains about 220 commands or instructions, and about 50 words for constant and answer storage.

There are approximately 60 commands used to determine the results of the equations before raising this result to a fractional power. There are about 80 commands used for decision-making and printing. Of these, 20 are kept permanently on one of four quick-access bands in the computer's magnetic drum memory. Another band is used for intermediate and final result storage and may be considered the printout tank. The log and antilog routines used require about 50 and 30 commands, respectively.

All numbers entering the log routine have a maximum limit which is less than one. Therefore, it becomes necessary to divide our result by 10 before entering the log routine, since in some cases our result has a value between one and two before raising it to the fractional power. This division by 10 must be compensated for by multiplication of all results from the antilog routine by $10^{.85 \log 10}$, which is called the scaling factor. The scaling factor is $10^{.85 \log 10}$ since .85 is the fractional exponent and 10 is the divisor. In other words, the scaling factor is the antilog of the product of exponent times the log of the number it is necessary to divide by. This is done to keep numbers entering the log routine less than one.

Determination of our logarithmic characteristics is accomplished by normalizing our number, which will tell us how many zeros there are to the left of the first significant digit. Because the log of a number less than one has a minus characteristic (with the numerical value equal to the number of zeros to the left of the first significant digit plus one), our characteristic determination is solved.

Our next concern is solving for the mantissa of the log. Solving the following approximating function in our program gives the desired result.

$$\text{Log } V = (1/2 + C_1Z + C_3Z^3 + C_5Z^5 + C_7Z^7 + C_9Z^9)$$

where $Z = (V - \sqrt{10})/(V + \sqrt{10})$ for $1 \leq V \leq 10$.

Actually, we enter the log routine with a number which we arbitrarily call X. After normalizing X, we may represent it by $X.10^K$. Due to the limits of V in the preceding equation, we must let V equal $10X\text{-}10^K$ or $X.10^{K+1}$; that is, K+1 instead of K represents our characteristic. Once log V is determined, K+1 is subtracted from it to obtain log X, which has both minus characteristic and mantissa.

The next step in our program is to determine the antilog of X. The antilog routine used with the computer is represented as such: 10^{-X}. Since our log routine gives us a minus log, we may enter its absolute value directly into the antilog routine after multiplication by our exponent. The mathematical steps used in the antilog calculation are as follows:

Let X = U + V where U = integral part of X
V = fractional part of X

Then $10^{-x} = 10^{-u-v}$ or $10^{-u}/10^{v}$

10^{v} is evaluated using the following approximating function.

$$10^{v} = (1 + a_1v + a_2v^2 + a_3v^3 + a_4v^4 + a_5v^5 + a_6v^6)^2$$

10^{-u} simply equals a decimal followed by u-1 zeros and a_1.

We now can complete our antilog computation by dividing 10^{-u} by 10^{v}. The resulting 10^{-x} must be multiplied by our scaling factor to give our final result.

Included with this report are four pages from the Deliverability Tables.* The first two illustrate pages to be used when there is a minus variation in company pressure, and the other two pages are used when there is plus variation in company pressure. ■

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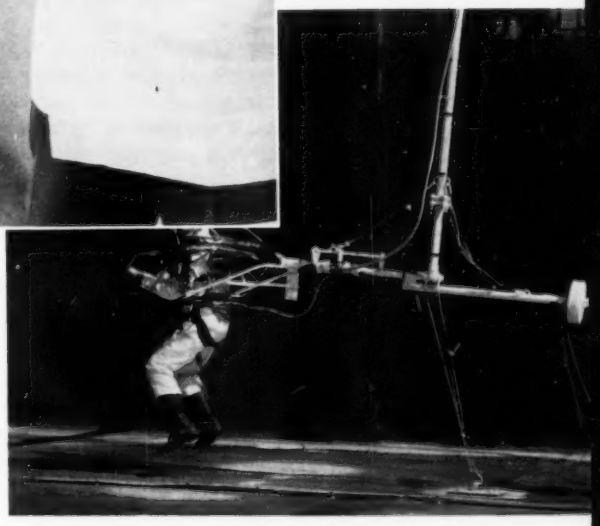
Rocket power

. . . a new pipeline tool



By JAMES JOSEPH

OUT-OF-THIS-WORLD power—rocket power—is being groomed as a new tool for pipeline construction.

For emergency welding, either in air or water, pipeline constructors will soon have a rocket-fueled welding torch . . . really nothing more than a plastic "soda straw" packed with ammonium nitrate and synthetic rubber (the same fuel that propels many a space bound rocket). Simple though the device is, it attains temperatures to 4000 deg F and, in burning an incandescent 1½-minutes, lays considerable bead. Prime applications: for low-cost emergency welding, as in pipelines, water tanks or where conventional welding machines aren't available. Probable cost: less than a dollar per torch.

Designed—and already "on the shelf"—are prime mover rockets which can unmire construction equipment, roll heavily laden rail cars to unloading spots and inch cumbersome beams into place.

In initial design at Convair in San Diego, Calif.,

TOP TO BOTTOM: Convair's short-haul, freight-lobbing rocket—seems destined to supply hard-to-reach pipeline construction sites with small tools, equipment . . . Rocket welding torch—attains temperatures to 4000 deg F. Burns incandescent 1½ minutes, lays considerable bead . . . Aerojet's rocket wings for pipeliners—being tested here in "tethered" flight.

is the first short-haul freight lobbing rocket . . . a projectile (range: up to about five miles) destined to supply hard-to-reach pipeline construction sites with small tools and equipment.

In the rocket works are propulsion brakes—designed as emergency equipment for trucks and heavy machinery working dangerous grades.

Typically, a bank of solid-fueled brakes might involve upwards of 10 3-in. diameter, 20-in. long retro rockets. They'd be installed beneath a rig's rear axle and detonated from a dashboard switch. Retrorocket brakes—their retarding thrust matching a truck's greatest calculable momentum under a runaway condition—would stop any rig, regardless of weight or speed. And stop it within 45 seconds.

Cost of a typical set of rocket brakes: about $300.

Already developed is a rocket-fueled "wand" that hurls a malt-thick borate solution some 40 ft to extinguish stubborn construction-site fires. Manpacked, the extinguisher consists of a sturdy 28-in. long, 4-in. diameter cardboard tube. Loaded with flame-smothering borate, it is fired by a propellant pill . . . a small capsule of solid rocket fuel which pressures the tube, dousing hard-to-get-at fires.

Nearing production is a line-heaving Very pistol that'll throw a nylon pilot line fully a mile across canyon or river.

The rocket-firing Very pistol (it's hand held) was designed by Grand Central Rocket Co. under a U. S. Maritime Service contract. The device fires a 1½-in. dia., 6-in. long rocket to which is attached a pilot line. Once the pilot reaches its target, heavier lines (tied to the pilot) can be hauled in.

Rocketdom's most spectacular contribution to pipeline construction is Aeropak—"rocket wings" that'll boost a welder atop a pipe bridge, lift a surveyor across a block-wide river or transport a timekeeper over a rocky mile of terrain in just under 60 seconds.

Aeropak is a major breakthrough in researchers' attempts to devise a harmless-to-humans propulsion engine capable of carrying a man on his workaday chores.

Powered by two harmless, steam-generating rockets, the flameless 70-lb flying suit—harness, variable-thrust rockets and controls—bottles a minute's flight-time in its twin boosters.

What's more, the device has already been flight tested . . . and adjudged "practical" by its builders, big Aerojet General Corp., which designed Aeropak to lift infantrymen over mine fields and Army engineers across rivers.

Aeropak's range: about a mile. Its cost: uncertain as yet, but likely it'll be reasonable, considering that improved models are in the works which weigh but 35 lb and are almost as simple to operate as a bicycle.

Sound like a rocketeer's dream? Well, it isn't. For rocket tools are fast shaping up on the nation's proving grounds.

All these spanking-new devices, of course, are "peaceful" outgrowths of the nation's rocket and missile programs.

"Their application to industry," says Don Billhardt, assistant director of technical services at Redlands, Calif.'s Grand Central Rocket Co., "stems principally from the development of solid propellants . . . fuels which are reasonably safe to handle and safe to ignite."

Consider for a moment that rocket welder. It replaces — in emergencies — costly and heavyweight acetylene machines, especially for quick-repair work where bead runs are modest.

Packed inside a straw-like plastic tube (¼-in. dia. and some 20 in. long) is solid rocket fuel. The fuel can be ignited with a match. And, since it carries its own oxidizing agent (ammonium nitrate, a common fertilizer), the welder operated readily underwater. Once lighted, the device attains temperatures in the 4000 deg range (hot enough for most routine

LEFT TO RIGHT: Rocket-fueled welding torch actually is a plastic "soda straw" packed with ammonium nitrate and synthetic rubber (the same fuel that propels many a spacebound rocket) . . . Another lobbing rocket is this low-cost missile originally designed as a firefighter by Grand Central Rocket Co. In its head, rocket can carry 76-lb payload a quarter of a mile . . . Already developed is rocket "wand" that hurls a malt-thick borate solution some 40 ft to extinguish stubborn construction-site fires.

maintenance chores). The welder merely runs rod in the "torch's" path, as in conventional welding. Result: a welded joint. A small job completed, the device can be extinguished simply by snipping off the tube. The burning portion quickly goes out, leaving unburnt—and usable—the rest of the slender rocket-fueled torch.

As for Aerojet General Corp.'s newly devised Aeropak? It should, within the next few years, give construction men Seven League boots.

Says Aerojet's project engineer, George F. Trudeau, "we have developed the first practical rocket-hoist device . . . which can lift a man hundreds of feet into the air, with perfect control . . . and safety."

Let's say that a cable 50 ft atop a pipe bridge must be repaired. A maintenance man would slip into the harness of his Aeropak. Fueled by a liquid propellant (hydrogen peroxide), the twin rockets' thrusts are adjustable from a control device held in the hand.

Without climbing a girder or hoisting a line, the maintainer merely triggers his rockets . . . and, lifting slowly, is carried aloft. A little manipulation puts him atop the structure . . . and within reach of the break. Having repaired the cable, he again triggers his rockets . . . and descends.

Aeropak is no gimmick. It was developed to carry shock troops across difficult terrain (hills, rivers, lakes) like aerial commandos.

What's more, the exhaust from Aeropak's nozzles isn't dangerous at all. Though heat in the rockets' combustion chambers may flare to 1300 deg F, exhaust nozzle temperatures range between 150-200 deg F. Further, nozzle exhaust isn't flame but superheated steam. Exhausts have been directed at clothing—and even at bales of hay—without damage.

Aeropak, already man-tested in tethered flight (the wearer restrained by ropes to prevent him rising more than a few feet from the ground), promises to turn pipeline construction crews mobile.

Says Aerojet's Trudeau, "we expect the device to be used widely by most construction companies. Hundreds of construction sites—and structures—can be reached with Aeropak . . . and without resorting to ladders."

Equally sure to find its way into pipeline construction use is the line-heaving rocket gun developed for the U. S. Martime Service. Involved is a fist-sized Very pistol (the same type used to fire distress signals at sea). Loaded into the pistol is a small, propellant-fueled rocket (not much larger than a modest sized roman candle).

Rocket pressure also holds promise as a construction tool. Already the Navy has used pressure from rocket ignition to empty ballast tanks . . . to do a pump's job, and to do it in seconds rather than minutes.

"Pressurization is perhaps the most readily usable output from rocket fuels," says one engineer. "For example, we're developing a hand-sized device which will inflate tires—or any other inflatable structure—in seconds. Utilized is exhaust pressure from safe, fast-burning solid propellant."

Solid propellant deserves closer scrutiny. For one thing, the very idea of toying with a rocket fuel is apt to discourage pipeline engineers. It shouldn't. For most solid propellants won't ignite unless triggered electrically or by a percussion cap. Even then, contained in fire-resistant plastic, most propellants merely burn. A hunk of the pliable, rubbery stuff can be burnt, in fact, in an ash tray—without danger.

Rocket power? It's out-of-this-world power . . . no doubt about it. Yet, Buck Rogerish as it may sound, rocket power is being groomed as a workaday tool . . . as an emergency welder, as an aerial elevator for workside crews, as rail-car positioner and as layer of communication lines.

For rocket power is destined to become a pipeline construction tool and sooner than you may think. ■

A report on the AGA

Automation

By F. VINTON LONG
Texas Eastern Transmission Corp.
Shreveport, La.

ON May 18th, the AGA Transmission Conference conducted a symposium on tele-control. Ted Rykala, chairman, communications and tele-control committee of the AGA, presided and the writer acted as moderator.

The participants were: J. S. Fouch of IBM Corp., Chicago; E. Wylie Head, Control Corp., Minneapolis; M. D. Shriver, Millard D. Shriver Co. Inc., Alhambra, Calif.; and Max Levy, Columbia Gulf Transmission Co., Houston.

I would like to bring out that the original meaning of symposium: "A Greek drinking party," did not apply to our gathering!

The symposium theme was taking a forward look rather than reciting previous accomplishments.

One thought that kept turning up was that human beings are still needed in a fully automated world.

This was despite a New York *Times* item which said: "The theoretical groundwork reportedly has been laid for the design of machines capable of learning from experience and adapting to circumstances."

When that happens, the battle between men and machines will be raging full tilt. But for a time, mere men still have the upper hand. We might as well make the most of it.

Although not particularly emphasized in this meeting, there is an aspect of human engineering in the field of automation or tele-control.

Human engineering is concerned with fitting arrays of simple or complex equipment to the man, so that overall, integrated, man-machine activity performs most effectively.

This is not too different from the way most engineers operate in designing their pipelines.

However, when a human engineer (applied experimental psychologist) goes to work, he sometimes adds one extra black box which he studies in great detail. This black box represents the human factor.

In this case, the human engineer draws upon principles, knowledge, and techniques used in the fields of psychology, physiology, anthropology and engineering, as well as in mathematics and, in particular, statistics.

That was a long sentence and I am indebted for it to Maurice Rappaport of Stanford Research Institute.

He gave a paper in Pasco, Wash., some time ago and used *Fig. 1* as an example of what you have to study to really automate something.

He says that the line labeled 1 represents an instrument display area of research. It is representative of a fairly simple system. Components are the man and instrument.

Line 2 represents where to work on design of manipulated controls, such as where to put knobs, how they should best fit a man's hand and what sort of "feel" or proprioceptive feedback is required.

Line 3 might represent a compatibility study to show a connection between display or feed-back information, man, and the control that he operates.

Rappaport has said that by systematically studying human behavior under a variety of work conditions it becomes possible to determine inputs which man can process most efficiently. By examining characteristics of his output, it is possible to design and construct equipment best suited to his use. Therefore, a man would not degrade the effectiveness of a system by being asked to do more than he can do in a given time.

He mentions, however, and this was mentioned by the writer later in the program, that there are special capacities that a person has which are difficult for a machine to duplicate. These are his adaptability and his ability to improvise. Machines can only accomplish relatively simple programs that are built into them. This limited nature of machines that are likely to be built in our lifetime points to at least two other functions at which men are superior—namely, judgment and inductive reasoning.

As he says, "to the degree that we fail to reduce all operations to logical, preset procedures, we need people around."

Rappaport has said that in any man-machine system errors are contributed by both. Most systems, while they do not reach perfection, nevertheless are built with that as a goal. Much effort is spent reducing system errors that come from crippling idiosyncrasies. This is always important, but not always economical in terms of cost or overall increased efficiency.

This is best illustrated, he says, by stating an important statistical relation and then making an example. This is shown in *Fig. 2*. It says that the statistical relation states that total variable area is equal to the addition of the squares of variable areas of component parts of the system. If component variables are uncorrelated, then the formula looks like equation 1 in *Fig. 2*. If the component variables are correlated in the formula, it looks like equation 2 in *Fig. 2*. The Greek letter sigma denotes standard deviation. The subscripts refer to a specific component of the system under consideration and refers to the correlation coefficient.

These formulas, in a sense, are efficiency formulas. They tell where the most impressive improvements can be made in the system. Stated in another but simple way, they say improvement in more accurate

and tele-control symposium

GAS exclusive

elements of the system will provide negligible reduction of total variable area of the system.

Rappaport also went on to say that graphs shown in *Fig. 3* indicate that man has progressed in a fairly straight line. He apparently will continue to do so without any great sudden changes. The use of machines has suddenly taken an upward trend as shown on the graph. The machine line on the graph is heading upward. Apparently in just a few hundred years the machine line will be completely out of sight and man will never catch up.

I believe that one of the outstanding statements made at the symposium was by Del E. York, of United Fuel Gas Co., that "A good communication man must be a good gas man."

He's saying that we communication and tele-control men should not lose sight of the fact that we are not working for a communication company. We work for a gas company. Our efforts should be directed toward the goal of showing gas company management the best way to handle communications and tele-control developments.

It also brought out that the ultimate goal of automatic pipeline operation is not to fire everybody and run it with pushbuttons. We want to make it possible for man to quit being a slave to machines. Let the machine operate for the man, to make it possible for a good man to do a good job better.

This is the way we have grown up for the last several hundred years.

Fouch of IBM led off in the symposium. He covered the advantages of digital computers in this application.

Fouch brought out the fact that a digital computer has the ability to modify its own instructions. This is a pretty hard concept to grab right off the bat, but it is a rather important one. This enables us to consider certain decisions and calculations that we come up with. For instance if an answer is on the negative side we want to do such and such, and if we get a positive answer we want to do something else. This is a change in conditions and then we have the computer actually modifying its own instructions.

He says that the problem of applications for digital computers or any computer was pretty well fixed 10 years ago. But only in the last two or three years have installations actually appeared to perform functions. It is quite an evolutionary process to get one of these things in operation. "You just do not go from here to there overnight. This is true in any control operation. More specifically, I think that this would be true in gas dispatch," he said. He reflects that he did not wish to be negative, but there has to be a lot of thinking going on before any computer is actually put in use.

About this time the writer stated that he had, the previous evening, talked to two distributor or customer representatives of a long line transmission company. Both said they would be prone to accept computing meters or flow meters or anything else with a modern concept for customer billing of their companies. Thereupon, the writer mentioned that in many cases the transmission companies are actually providing the lag in this evolution because their customers are perfectly willing to take steps to expedite the march of progress.

The next member of the symposium was E. Wylie Head. He had this to say:

"Petroleum people had been using remote control or tele-control for years, in some cases operating some stations with no one within a hundred miles of the point involved."

He said that the electric utility industry had been using power control principles for 20 years to control sub-stations and hydroelectric plants. He said that a hydroelectric station plant is, in a sense, the same thing as a compressor station. The problems are the same and you go through about the same motions. All you need is a communications link to carry back intelligence from the compressor station to the control center, and adequate control equipment to issue appropriate instructions from this information.

Head said that a compressor station must, itself, be self-contained with full fail-safe equipment. This has been pretty well accomplished. In the case of centrifugal compressors, the last missing link is now

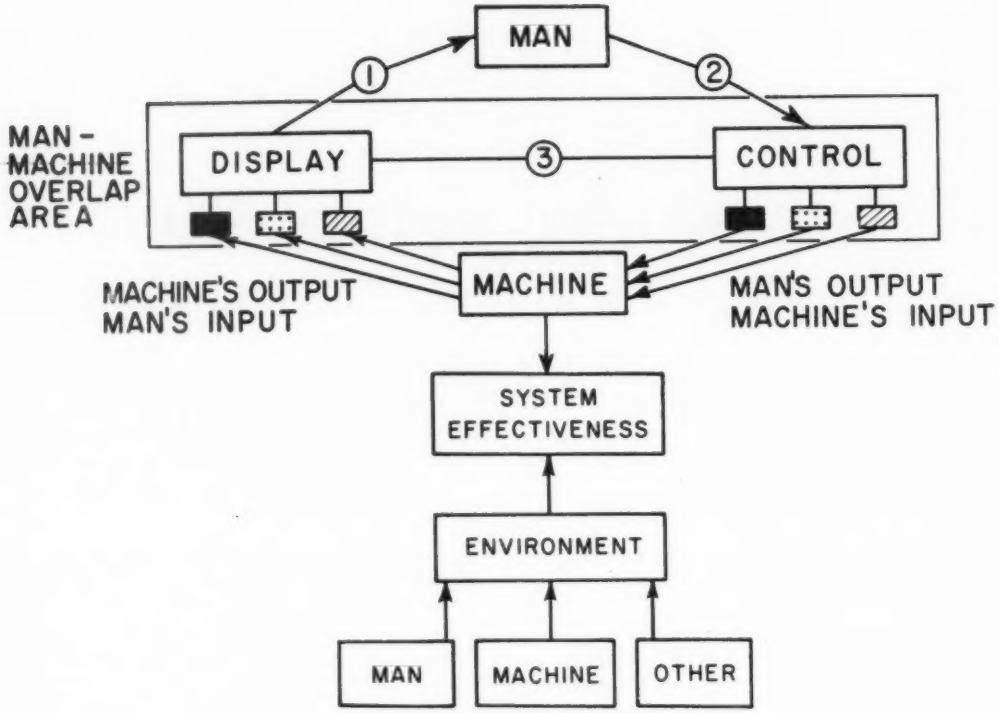


Fig. 1. Man-machine interaction

available. This missing link is a surge protective device known as "Surgetrol" to protect the centrifugal compressor from dangerous surges, and to reduce surges while maintaining operation without a shutdown.

Head mentioned that supervisory control equipment is here and has been proven for years. He believed that the one big change we are going to see in tele-control principles is a method of receiving data from remote locations.

The traditional gas industry method of receiving information from a remote location is by some type of time-duration telemetering, whereby, at a particular location, you tie up a channel for that particular information for an appreciable length of time while the data is being transmitted to the receiving office. This system is not as accurate as it should be, he said. It is bulky, cumbersome and you wind up with a whole wall full of recorders. This is confusing to a fellow who is trying to gain intelligence from many charts. Head maintained that in measuring gas flow, the accepted method is a differential pressure flow meter and a special chart recording pressure and temperature differences, etc. This chart is run around on an integrator by some operator and you wind up with customer billing. He says that, personally, some improvement could be made.

He believes that ultimate transmission will be with a digital system. All the information will print out on one typewritten sheet for record purpose. The same information could be used for tele-control of an automatic pipeline.

He mentioned that old time operators might say that with this method you cannot watch trends. However, he said that he believes it is just a matter of getting used to it. One can watch trends by seeing changes in values from one reading to another.

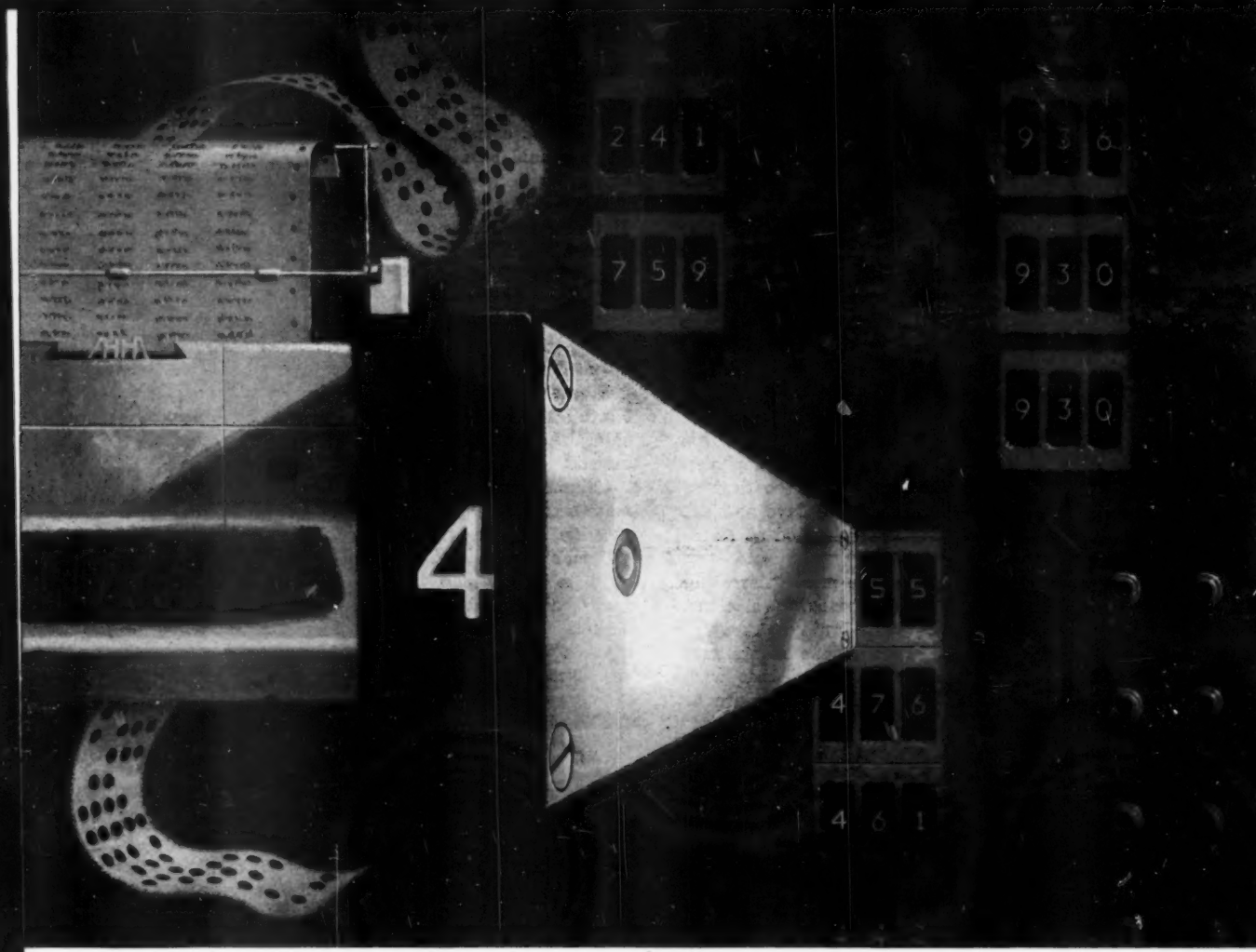
Head feels it is quite valuable to have a telemeter transmitting system store its own data and hold it for call should the communication channel become faulty.

He mentioned that equipment is being bought for a southern electrical utility which takes gas from the Houston-Coastal Florida pipeline. It is designed so that each hour it brings to the power dispatcher's attention (1) the flow each boiler has taken, (2) the 24-hr total flow for the steam plant itself, and (3) the 24-hr total flow for the whole electric system scattered all over southern Florida.

The gas industry's customers' have confidence in these methods, Head explained. The reliability is here and the writer believes there is no reason why gas transmission companies cannot use equipment as modern as that of their customers.

The writer, as moderator, then came back on deck and said: "You cannot do one darn thing with an automatic pipeline unless you have adequate communications. We in AGA feel that the right to chose our type of communications is vital to our industry. Without adequate control you are out of business and a whole $500 million pipeline or a $1 billion pipeline goes out of operation."

The next member of the symposium to speak was Max Levy, of Columbia Gulf Transmission—formerly



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Gulf Interstate Gas Co. CGT operates 820 miles of 30-in. line from Rayne, La., to United Fuel Gas, their only customer. Five unattended centrifugal stations are operated by tele-control from CGT's central control point at Nashville. They have two sales measuring stations in Kentucky. Both of these are also unattended and controlled from Nashville. They use digital telemetering exclusively.

He said that CGT has a computer at the control center which receives information from four pickup points along the system and from two sales measuring stations. Sufficient data to transform this intelligence into a flow rate is sent.

Panel board posting is done digitally. They have no circular charts or conventional gauges. The whole thing is carried out digitally. This year they plan to fully automate their pipeline. After the first of the year or shortly thereafter they will have no shift employees except for one dispatcher located at Nashville.

Levy brought out that one of the most interesting tele-control items is the sales measuring stations. They took a new approach when designing.

Conventionally, gas dispatching is done on pressure and he said their stations are controlled that way. They send stations a certain discharge pressure to maintain and they maintain it.

However, at sales measuring stations, due to rather complicated calculations that must be made, they felt there should be a logic device to let the station calculate its decisions.

So the dispatcher, if he receives an order from United Fuel Gas to send 300 million through one of these stations, sends the number 300 to that station. The station has a small and inexpensive analogue computer to compute station flow, so the station takes over control to meet this 300 million flow order.

It is proving, he said, to be fairly successful. They do not have the ultimate in accuracy; however, they are working toward a better accuracy right now. Fortunately, he said, their customer is quite considerate and is cooperating with them to the fullest extent.

Columbia Gulf's gas system is fairly easy to automate because it is a very constant flow, highly efficient pipeline. Levy mentioned they can target for months and months almost to the cubic foot how much they have to transmit. Therefore, they don't have to worry about pocket conditions. CGT can set its pockets once a month, say, and predict that five engines will run. These five engines will run until an upset condition occurs. At that point they will probably be forced to go off the line.

According to Levy, present plans are to automate

Uncorrelated Variables

Fig. 2

$$\sigma_T^2 = \sigma_a^2 + \sigma_b^2 + \sigma_c^2 + \ldots + \sigma_n^2$$

Correlated Variables

$$\sigma_T^2 = \sigma_a^2 + \sigma_b^2 + \sigma_c^2 + \ldots \pm 2r_{ab}\sigma_a\sigma_b \pm 2r_{ac}\sigma_b\sigma_c$$

$$\pm 2r_{bc}\sigma_b\sigma_c \pm \ldots$$

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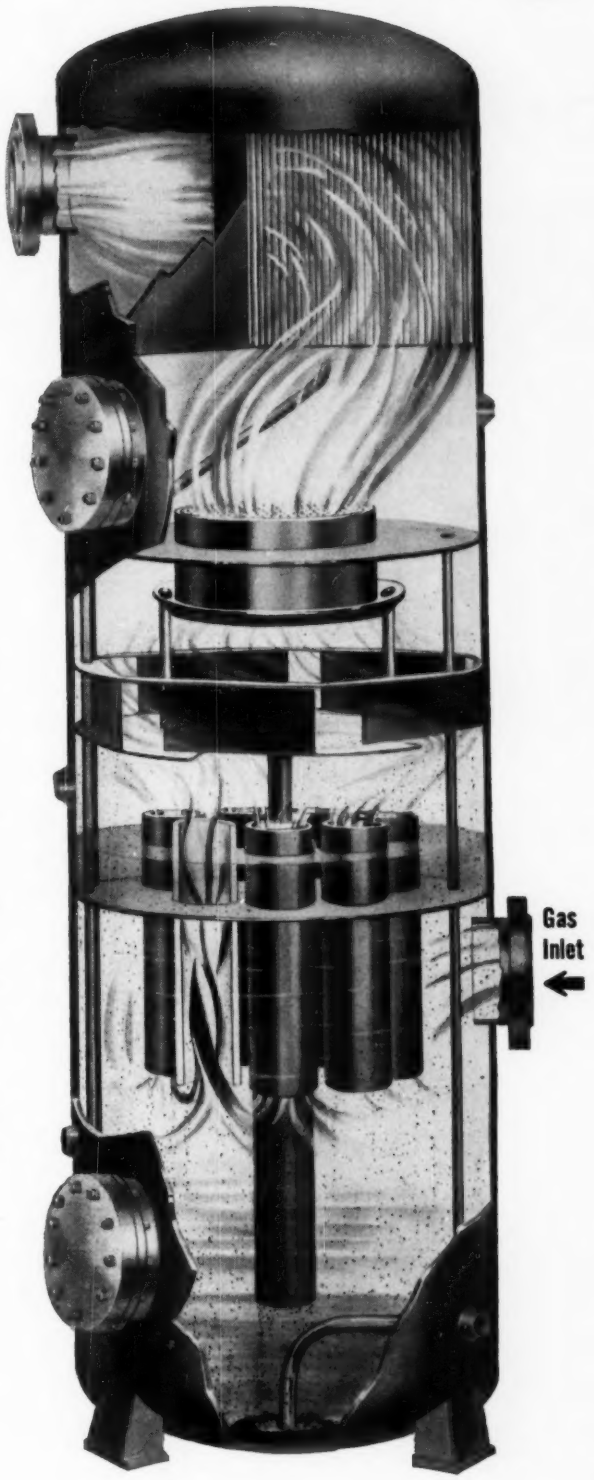

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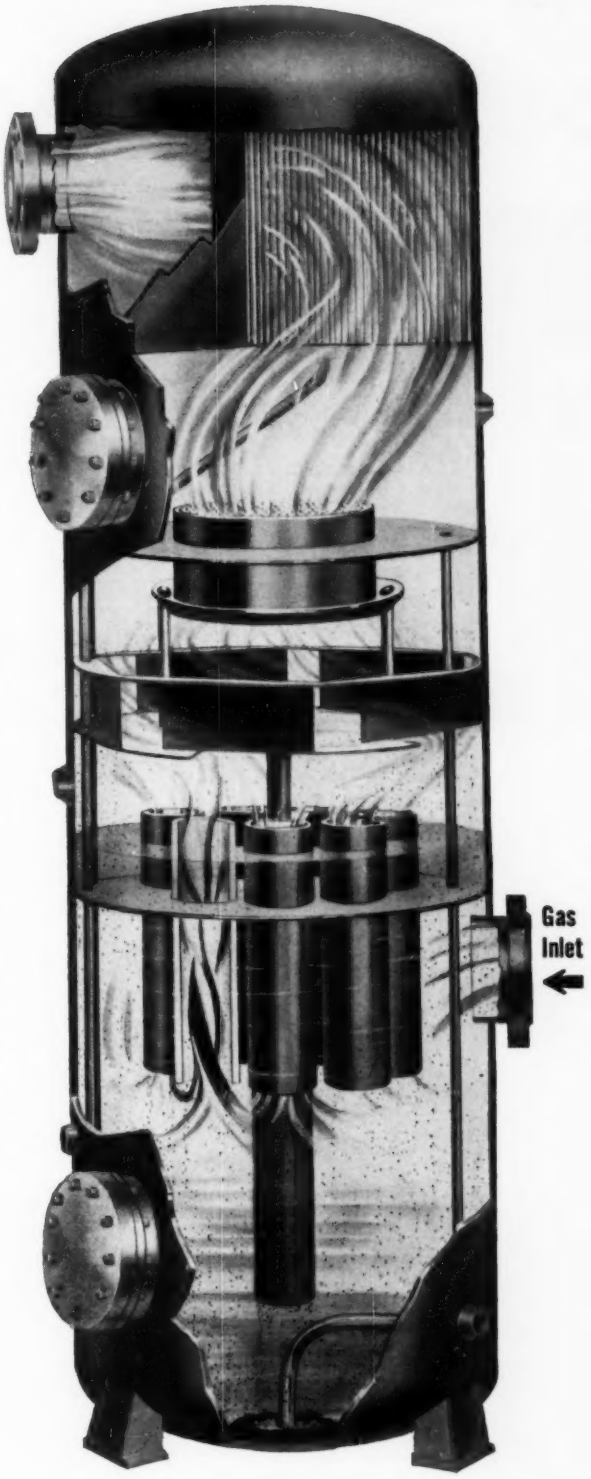

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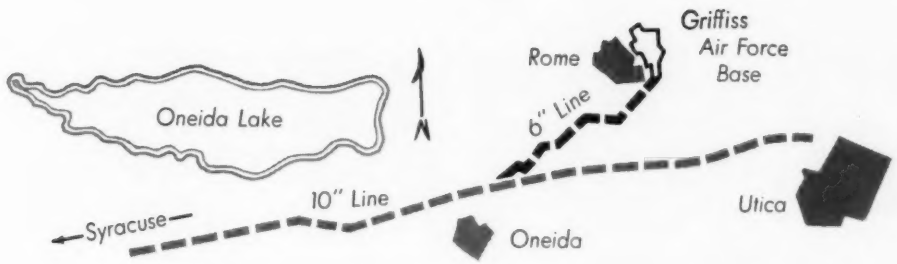
Jet fuel line goes in despite snow...



....ice...frost...and mud

EARLY THIS YEAR, Buckeye Pipe Line Company installed the 11-mile spur line which now supplies Griffiss Air Force Base with jet fuel. Built with Bethlehem 6-inch electric resistance-weld pipe, the spur takes off Buckeye's 10-inch Syracuse-Utica products line at Verona, N. Y., and ends at the Air Base just outside Rome, N. Y.

Because of the urgency of the project, the contractor, Sheehan Pipe Line Construction Company, laid a good part of the line on top of the frozen ground. It was buried later when the first thaw permitted ditching. And to save even more time, the entire 11 miles was tested with product instead of water. Characteristic of sound pipelaying practice coupled with the top-quality of Bethlehem pipe, the line tested out perfectly.

Our engineers will be glad to assist you in any way possible. Just get in touch with the nearest Bethlehem Steel sales office.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.
Export Distributor: Bethlehem Steel Export Corporation

NEED LINE PIPE? *Bethlehem makes hydraulically expanded electric fusion-weld pipe from 18 in. through 42 in. OD with walls to ¾ in. in all diameters, and in 40-ft lengths; electric resistance-weld pipe from 5 in. (nom.) to 16 in. OD, in lengths to 60 ft; and continuous buttweld pipe ½ in. to 4 in. (nom.) in various lengths. Bethlehem line pipe meets the appropriate API specifications.*

BETHLEHEM STEEL

BETHLEHEM STEEL

new installations put on their pipeline and try their best to improve equipment as advances in the art are made.

The last speaker was M. D. Shriver, of Millard D. Shriver Co.

He said that he would like to see if he could come up with what we are going to see in two years, five years or ten years.

He feels the United Fuel Gas System has accomplished a lot, but one thing "missing" is automatic control of the line. He said that now they do it by supervisory control which is operated by the dispatcher.

"In other words, we have upgraded the work of this man and have eliminated the necessity of the dispatcher making a lot of detailed studies and have, rather, given him information so that he can make the decisions," he said.

This is a primary basis of all tele-control systems, he feels. Now we are going to go one step further to close the control loop itself. We are going to do this with a digital computer.

Mr. Shriver said that present loops use analogue methods of telemetered information which, in some cases, have inherent inaccuracies. Thus, they will not allow us to achieve overall accuracy that a digital computer gives. He said that the computer would receive all pertinent information from sales and purchase points. Also, data such as weather, actual purchase price of gas, the actual cost of operating individual stations, etc., would input. The computer would then take over and issue supervisory instructions to various compressor stations, meter runs or intake points along the line.

Use of a digital computer will permit use of what he calls a "starter program control" which would permit it to make changes instantaneously 24 hours a day.

And two things that they have discovered from operations of an existing system are (1) a necessity of having the dispatcher understand and act on trends, and (2) to have operating limits set up.

Also, with this type of installation, the dispatcher can get specific information as to trends. These trends will be monitored at a much higher speed than is possible with human beings looking at a lot of analogue instruments or charts. The machine will advise instantly if any particular parameter is out of balance. Further, Shriver doesn't want anyone to get frightened about a computer. A computer can only do arithmetic. It can only add and subtract. Another thing to remember is that it cannot reason. It can only do and perform functions that men tell it. We put in certain instructions and it will act on these instructions. The result is the computer gives out information to the extent of accuracy that goes into it—nothing more. If the information received is incorrect, its decision making ability is going to be incorrect. So, therefore, man, somewhere along the line, has to monitor a computer setup. That is where the upgrading of dispatchers comes in.

Shriver said, "We would have to solve out or study what the dispatcher does in a particular system and we have to reduce that down to common arithmetic so that these instructions can be acted upon in a precise manner. In addition, we have the versatility to have the machine monitor itself, as it were, and modify any particular set of instructions according to a particular circumstance. We can set up with an order of priority so that when certain particular events occur the computer is made aware of them and can automatically reset, change, start, stop, etc., compressor stations and work from that standpoint."

He said that this concept will not be too far in the future because the hardware is here. "It means that all we have to do is put it together in one big package."

He said that general purpose digital computers (the heart of a system) will remain practically unchanged. Perhaps the storage or memory capacity will be increased. Computer functions, he said, will not change and, therefore, hardware will be compatible with anything we have in the future.

"All we have to do is have a few little black boxes assuming the sum of the signals. Inputs might be digital, some might be analogue and some might be

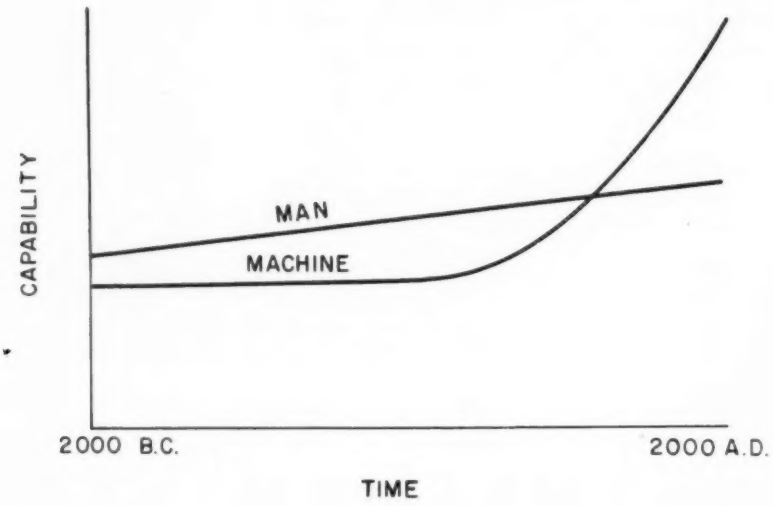
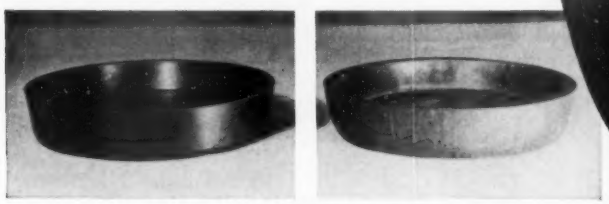


Fig. 3

NEW WmSON TAPRSEAL®

SCRAPER CUP

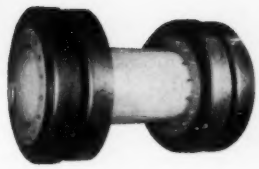
OFFERS PROVEN RESISTANCE TO WEAR, TEAR AND SWELLING!

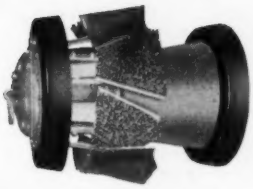


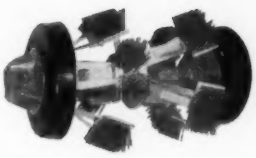
Actual photographs of TAPRSEAL cup before and after simulated pipeline test in ethyl gasoline for five days (500 miles)

Williamson testing equipment, the only repetitive COMPARATIVE cup tester in existence, has proven the TAPRSEAL to be WEAR RESISTANT . . . TEAR RESISTANT and SWELL RESISTANT. As the photographs show, there were no tears or breaks and only minimum wear after this torturous test.

Specify WmSon TAPRSEAL Scraper Cups . . . developed after years of research . . . proven after months of testing.







TAPRSEAL Scraper cups for all types of pipeline scrapers from 2" to 36".

PIONEERS OF PIPELINE EQUIPMENT

T.D. Williamson, Inc.
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REPRESENTATIVES AROUND THE WORLD

PARTNERS IN PIPELINE PROTECTION

Johns-Manville
BLUE FLAG®
Fiber Glass Wrap

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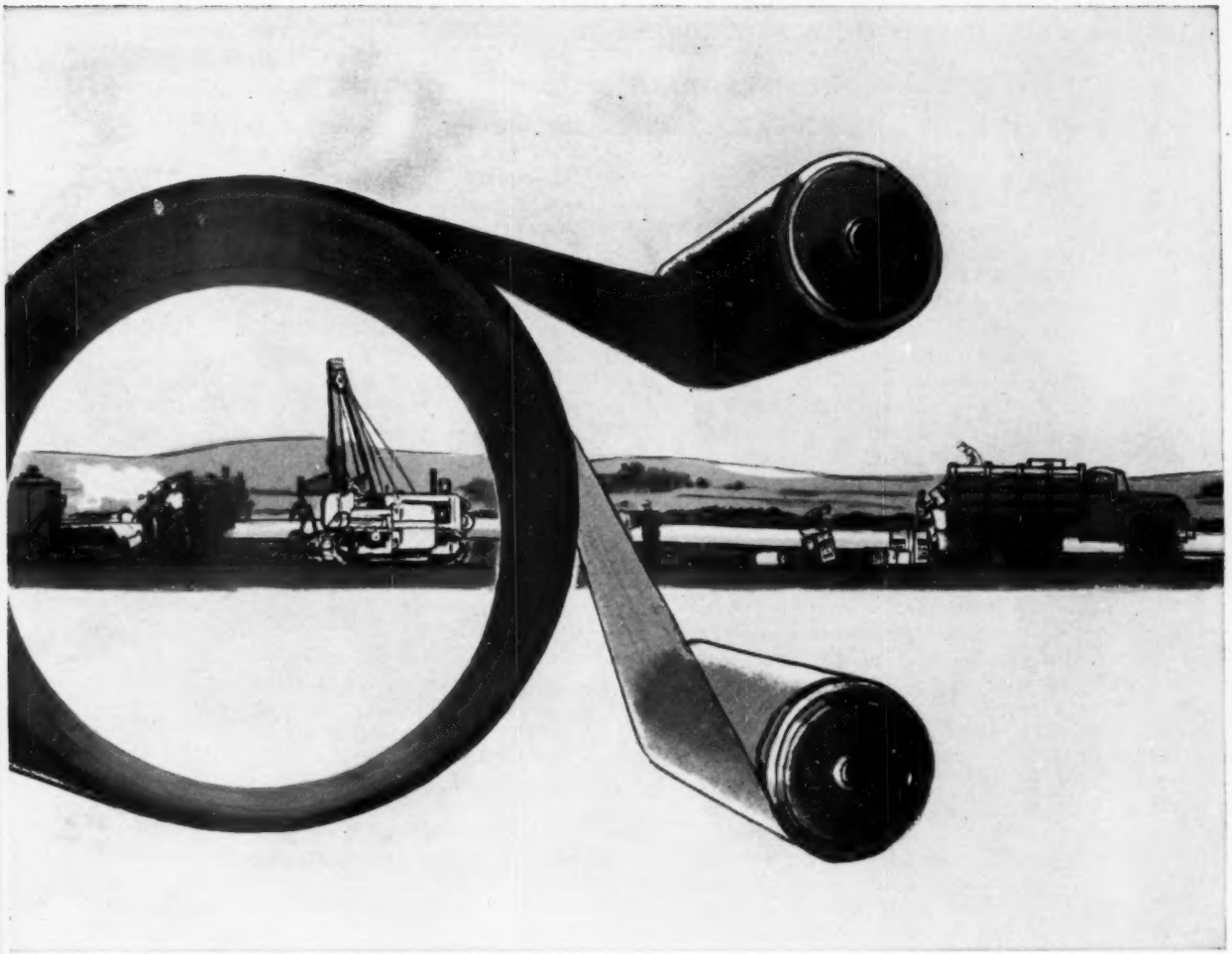
—your assurance of maximum protection

J-M Blue Flag Wrap is made of specially formulated, chemically resistant glass fibers which are parallel reinforced with continuous strands of fiber glass yarn for high-speed application.

1 J-M Blue Flag Wrap—for enamel reinforcement

Johns-Manville Blue Flag Wrap is a uniformly porous fiber glass wrap. It lets enamel bleed through quickly . . . actually becomes an integral part of the over-all pipe coating. Like steel reinforcement rods in concrete, Blue Flag reinforces the pipe enamel giving it extra strength, hence extra working life. Because it is made of inert, inorganic fiber glass, this wrap cannot rot, decay, or absorb moisture.

With L.O.F. Glass Fibers Company joining the J-M family, buyers of pipeline wraps and tapes are now additionally served . . . by an enlarged staff of Johns-Manville sales and technical personnel operating out of 56 sales offices . . . by expanded distribution facilities . . . by the addition of 7 strategically located plants . . . by expanded research and product development laboratories. For further information, write to J-M, Box 158, N.Y. 16, N. Y. In Canada, Port Credit, Ont.



and service life for pipelines

J-M Transhield Felts, asbestos reinforced with parallel glass fibers, come in 2 types for field or mill wrapping; #15 Transhield (heavyweight); #8 Transhield (standard). #15 plain Asbestos Felt also available.

2 J-M Transhield—for a tough outer shell

Apply an outer wrap of this inert, inorganic asbestos felt—and give your pipeline investment *complete* long-life protection. Asbestos, the magic mineral, comes from the ground . . . is always at home in the ground . . . won't rot or decay. In J-M Transhield these asbestos fibers are impregnated with a coal tar or asphalt saturant to form, literally, a flexible covering of stone, providing a strong, highly durable outer protective shell.

JOHNS-MANVILLE

JOHNS-MANVILLE PRODUCTS

"You cannot do a thing with an automatic pipeline unless you have adequate communications"

manual instructions, depending on how you wish to insert such things as weather forecasts or other things pertaining to economic dispatch of products being transported in each case," said Shriver.

In the near future a number of plants are going on fully automatic control under the direction of computers. The computers themselves will operate the final control elements directly. "All industries will benefit from the advancement of this science," he said. "This accumulated knowledge, of course, is fast changing in this particular business that we are in from an art to a science. I think that we will all have to recognize now that we have a science."

The writer then brought out the point, after the last panel member discussion, that some of the audience were probably wondering why we have less emphasis on communications and more on tele-control at this session. Actually, without communications there cannot be any control. He mentioned that the communications part of the AGA meeting would be discussed the following day. It was emphasized, though, that many people in the gas industry (particularly management) don't realize that you could have a cooperative microwave system.

The fact is that any industry that has a right to be licensed for its own communications system, in this case a microwave system, also has the right to join forces for a cooperative system on an expense sharing basis. This would cut down costs considerably. Thus, in some instances, a company could afford a communications system controlled by the company.

The writer mentioned that the symposium was addressed by a supplier, a user, and a consultant. And it should be remembered that no computer can ever replace a man. Nor can a computer do what man has been sent here to do—to think, to dream, and to create. To make things better both for ourselves, for the company we work for, and for our country. None of us should get to the point where we think machines can replace a man for his integrity. A machine does not have integrity. A machine does not have a conscience. Machines are nuts and bolts, transistors, and a few things like that. Further, despite all the talk about making automatic pipeline, good communications, good control, good computing, it is hard to get away from the fact that no machine will ever have a desire to make a better world for man.

During the question and answer period it was brought out that Columbia Gulf uses a teletype quality line for data transmission. It was also mentioned that they do not have too much of a surge problem because of their wheel construction and their constant flow condition. The writer brought out the fact that Texas Eastern has made an elaborate study of surge protection and, due to its system characteristics, would not think of having an unattended, large centrifugal-class station without this protection.

Further discussion centered around the concept that what is sometimes called a flow computer is actually a flow calculator. This little device checks information that is sent to a dispatching center—such as differential pressure, number of runs in operation, static pressure and the temperature. It then calculates flow and reads out in MMcf per day, computed to three digits.

It was brought out that it is advantageous to telemeter information from a remote station only when there is a change so that circuits are not continuously tied up.

Shriver indicated that the time element involved makes gas dispatching problems quite different from those of electric utilities and missile dispatching, for instance.

He said that the art or science of gas transmission system field dispatching has to take a lot of things into consideration. Some of these should be acted upon immediately, others need not.

"But the thing that is important will be to reduce such information as line pack into computer language so the computer can add this to its memory storage and as the condition changes action can be taken." Shriver mentioned that when United Fuel Gas started out to design an economic dispatch system, it called in all the operating personnel, and him, as consultant. "They tried to jell down something concrete about every operation and each bit of information. They wanted to eliminate everything that was not required and to make sure that everything that was required was in the computing setup.

"One of the things that we have to remember is that when you put in this new type of tele-control you have to evaluate what you mean by automatic control. Then you have to determine what the state of the art or science is in your particular organization. After that, the next step is to determine the state of the science in the field as a whole. Then, you work the two of them together to come out with an answer."

Shiver said that in the case of Gulf States Utilities' expanded automation in a plant at Beaumont, 23 personnel were upgraded. There were about 10 per cent old operators and about 90 per cent new operators. After three years' operation it was hard to tell which were more efficient. He really did not believe that there was any problem in upgrading personnel.

The writer and moderator went on to say that you do not attain more accuracy because you have a larger recording chart. There must be an inherent accuracy in data which must be transmitted to a distant point without error. In many cases these can be in digital form quite efficiently. This does not mean that all analogue methods should be thrown out the window. But operating personnel should clearly understand that the size of a chart is not proportional to change in accuracy. ■

One of the 11 Foxboro T/37 Dry Flow Meters, measuring wet gas to separators, at W. L. Pickens' North LaWard Field, Jackson County, Texas.

"Wet gas can't foul it . . . overrange can't hurt it . . . and it doesn't need maintenance"

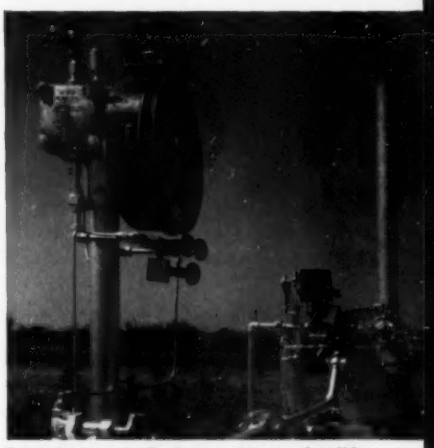
THE FOXBORO T/37 DRY FLOW METER

"Undoubtedly the most reliable flow meter we've ever used." That's the report on the 11 Foxboro Dry Flow Meters at W. L. Pickens' North LaWard Field in Jackson County, Texas.

Walter B. Hollow, Drilling and Production Superintendent, states that even though these meters have been in service over a year, none have ever needed re-calibration.

"The Foxboro Dry Meter also eliminates a problem we had of mercury being lost on sudden overranges caused by line surges," Mr. Hollow adds. "And of course, our weekly chore of draining mercury to remove water is a thing of the past."

Producers, pipeliners, plant men —they're all praising this outstanding Foxboro flow meter. Get the complete story on the T/37 in Bulletin 7-15. Or ask your nearby Foxboro Field Engineer. **The Foxboro Company, 3410 Norfolk St., Foxboro, Massachusetts.**



Specially-formed diaphragm discs and solid metal spacer rings insure the T/37 Dry Meter from overrange damage. Spacer rings also protect diaphragm assembly from rupture or distortion by dirt particles—or hydrates formed in moisture of gas lines.

FOXBORO
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FIRST IN FLOW METERING

Many new techniques and methods of telemetering are available today as a result of rapid advances in the science of data processing and transmission. Today, more than ever, selection of the telemetering system best suited to a particular application requires careful study of many alternatives to insure maximum effectiveness at minimum cost.

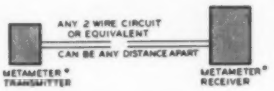
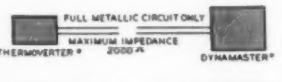
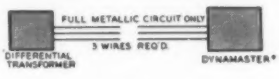
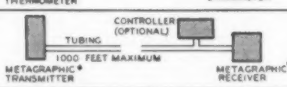
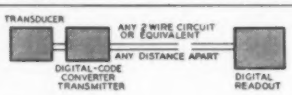
The Bristol Company offers *all* the major types of industrial telemetering systems, as outlined in the table herewith. For some applications, of course, certain features of one system may be combined with another, allowing great flexibility in tailoring a system to your application.

The complete line of Bristol industrial telemetering instruments embodies over 45 years' experience in this field. Bristol engineers are always ready to recommend telemetering instruments to solve your particular problems or to work closely with your own engineers in the design of a complete telemetering system to your requirements.

For further information, write: The Bristol Company, 119 Bristol Road, Waterbury 20, Connecticut.

TIPS ON INDUSTRIAL TELEMETERING

for pipe lines, utilities, and process industries

TYPE	OFFERED BY BRISTOL	SIMPLIFIED BLOCK DIAGRAM	ADVANTAGES AND LIMITATIONS	MAJOR USES
IMPULSE DURATION	Metameter*		Simple electro-mechanical device. Will transmit over wire circuit, carrier or microwave links. Offered in 60, 15, 5 or 2 second impulse cycles.	For analog transmission of all measurands.
VOLTAGE	Thermoverters* & Dynamaster.* D-C Transmission		Instantaneous transmission. Limited to full metallic circuits of 2000 ohms (2 wires) free of parisitic currents.	For analog transmission of electrical quantities.
	Differential Transformer Transmitter & Dynamaster. A-C Transmission		Instantaneous transmission. Limited to full metallic circuits. (3 wire.) Can operate into electronic control directly.	For analog transmission of mechanical measurands.
FREQUENCY	Frequency Type Transmitter & Receiver with or without Audio Tone. (RFL) Model with Dynamaster End Device		Practically continuous. For millivolt inputs or measurand to millivolt pick-ups. Will operate over wire circuits, carrier or microwave radio links.	Primarily for transmission of electrical measurands but may be adapted to non-electrical quantities where high speed transmission desired.
PULSE COUNT	Transmitter — Contact Making Device. Receiver — Relay Operated Magnetic Counter or Running Count Recorder	ANY 2-WIRE CIRCUIT, ANY DISTANCE APART PULSE-COUNT TRANSMITTER (CONTACTS) TELEPHONE TYPE RELAY DIGITAL COUNTER OR RUNNING COUNT RECORDER	Simple. Will transmit over wire circuit, carrier or microwave link.	Primarily for total flow transmission. Not used for instantaneous flow.
POSITION	Dynamaster Resistance Thermometer System		Instantaneous Transmission. Requires 3 wire metallic circuit not exceeding 1500 feet.	Temperature measurements.
PNEUMATIC	Metagraphic System. Metavane* System		Limited to 1000 feet of ⅛" tubing. Can operate into pneumatic control directly.	For non-electrical quantities where pneumatic transmission desired.
DIGITAL	Bristol Servo Transducer with Westinghouse, G. E., or Union Switch & Signal Pulse Code System		For transmission over wire circuits, carrier or microwave.	For digital transmission of all measurands, especially where pulse code supervisory control is available. Direct print-out of readings.

*T.M. Reg. U.S. Pat. Off.

Write for technical information

BRISTOL TRAIL-BLAZERS IN PROCESS AUTOMATION

AUTOMATIC CONTROLLING, RECORDING AND TELEMETERING INSTRUMENTS

Edited by FRANK CHAPMAN

"I want a big meter so I can read the chart"

By F. VINTON LONG

HOW many times have we heard that? Quite a few? We all know that a large chart or a large meter dial is easy to read. It doesn't strain our eyes a bit, and the width of the pen line in a chart becomes less important.

But what I want to say is that it don't mean a thing.

No recorder can introduce accuracy into a system which is inherently inaccurate.

And most of our present telemetering systems just don't cut the mustard when it comes to a true reading.

First, the transducer is sometimes off, and then the communication transmission methods don't help any.

All of this can be ignored in the case of purchase points and sales stations of a gas transmission company, providing we assume that all errors will even out in time and everyone will be happy.

But if we look at pipeline control we have a different thing. There is nothing to average out; every time a wrong reading is utilized there is money gone forever.

Whether you run on pressure or volume, you must know what is going on, and this certainly applies to an automatic pipeline.

Now supposing you are running a pipeline on station discharge pressure.

You know that you should have a station at a certain discharge pressure to make full use of your pipeline. So you look at your large meter or chart and from that you set the compressor maximum efficiency point.

You just think you do!

You will think in terms of pounds, but the reading might be 20 lb off. All the big chart or big scale is doing is to make it easier to read the error.

The same thing goes for present orifice meter readings for purchases and sales, but somehow it usually all averages out.

The sales and purchase points are, of course, easily handled by flow meters, and you send the output digitally into your control points and billing machines.

The compressor control thing is a little different. If you operate on flow you use a flow meter, again with digital transmission both within the station loop and to the dispatch point.

Operation on discharge pressure requires a real honest to goodness pressure transducer, with the output transmitted digitally to both the station loop and the dispatch point.

The digital transmission portion is easy and you can buy it off the shelf.

Right now I want to say that the communication link, and I mean any type, will transmit all digital and most analogue intelligence absolutely without error.

You can, with money, buy quite accurate transducers right now. However, maybe we can do better with an additional device such as a suppressed lower scale meter, which would read out only within the critical operating range.

With this method, the instrument would only have to read the portion say between 900 and 1100 psig. This would give a total reading range of 200 psig between the lower and upper ends of the scale. Assuming a 1 per cent error, 1 per cent of 200 psig is 2 lb, or say 2 lb at usual operation pressure of 100 psig.

Compare this with the conventional methods of complete scale readings, say a 0 to 1100 psig device, with the operating average at 1000 psig.

If we take 1 per cent of 1000 psig we come up with 10 lb.

Quite a difference, isn't there? About 500 per cent more accurate.

It's not too hard, and when we do it, we will control efficiency with 0.10 per cent devices instead of 2.0 or 3.0 per cent as we do now. ■

Group of visitors inspects the Brooker station (Bradford county, Florida) of the Houston Corp's recently opened Florida gas system. This station is equipped with Worthington 2000-hp SEHG engines driving balanced opposed compressors. The gauge board at left was specially designed to show at a glance data concerning operation of the gas engines and compressors.

More than two thousand

EPON® resin internal coatings for give lower maintenance costs

... *plus 5% more through-put*

EPON RESIN-BASED internal coatings are making pipeline history *right now* . . . by lowering maintenance costs, speeding gas flow and minimizing the expensive annoyance of scale-jammed valves.

Among the toughest, most durable plastics known to modern chemistry, Epon resin has an outstanding record in surface coatings that protect against corrosion, depositions, scaling and paraffin build-up. Enamels based on Epon resin have remarkable adhesion, excellent resistance to impact and abrasion, and the ability to withstand the attack of corrosive chemicals.

The smooth, uniform surface of Epon resin internal coatings permits greater through-put, makes possible reduced compressing costs—and helps to deliver cleaner gas products. More than 2 thousand miles of Epon resin-coated pipeline are in service, giving good performance under varying operating conditions.

Easy-to-apply with specially designed interior coating equipment, Epon resin coatings cause less wear and tear on the pig . . . give you *clean* pipe on start-up. Old lines can be coated while still in place with specially developed underground equipment. Still another bonus—the bright surface of the Epon enamel coat reveals structural defects in the pipe that otherwise might be overlooked.

Get complete information on this revolutionary pipeline development by contacting your nearest Shell Chemical office.

EPON puts the power in paint

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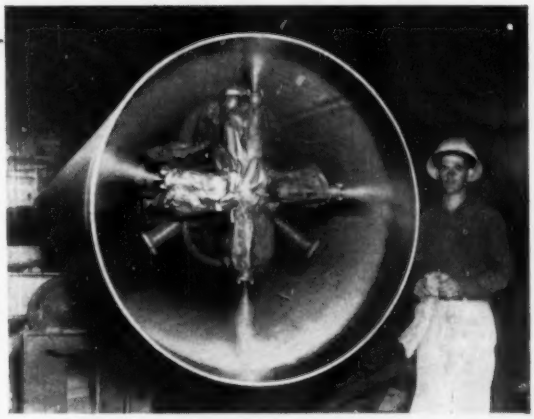
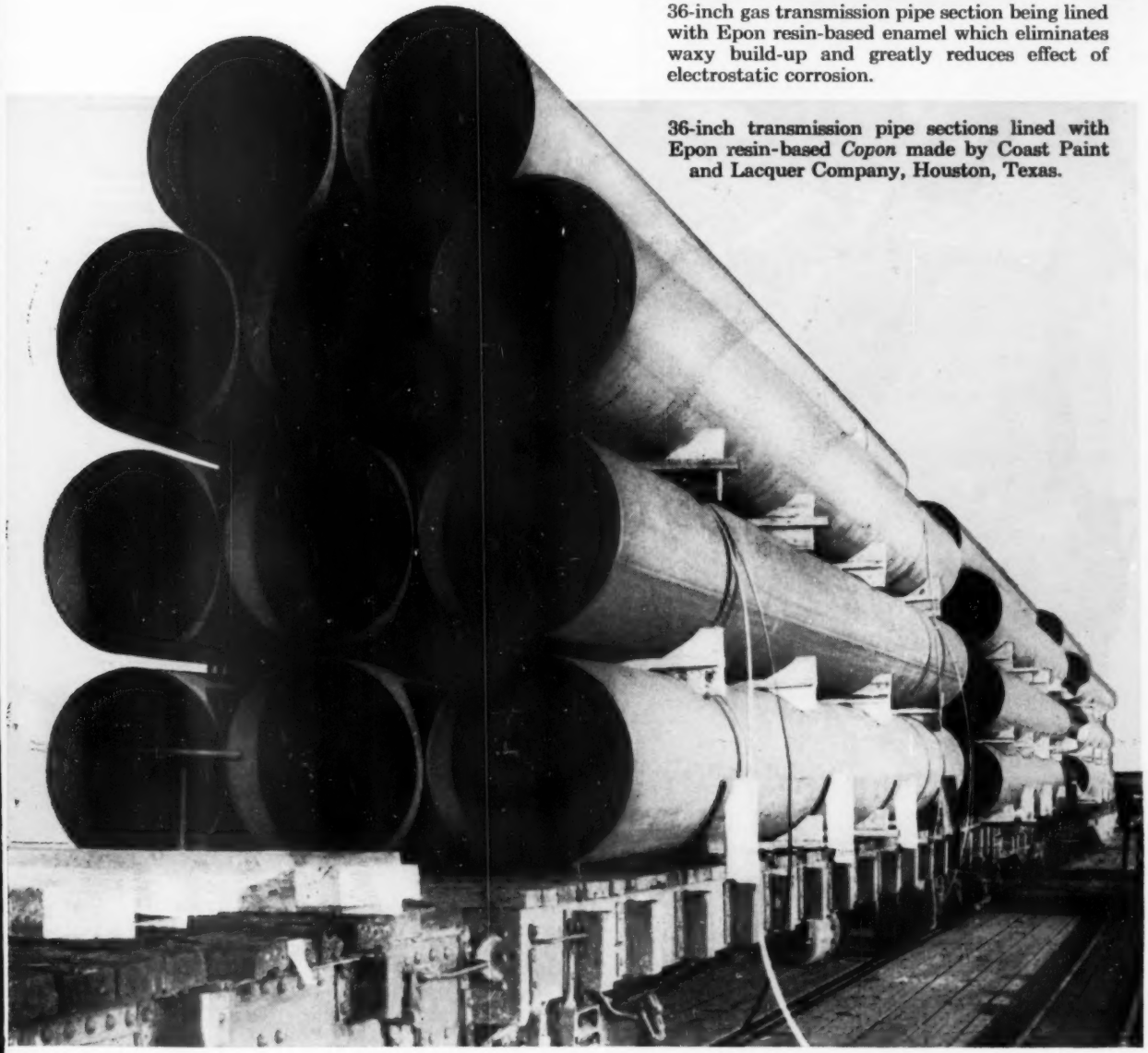
SHELL

miles in use!

gas pipelines

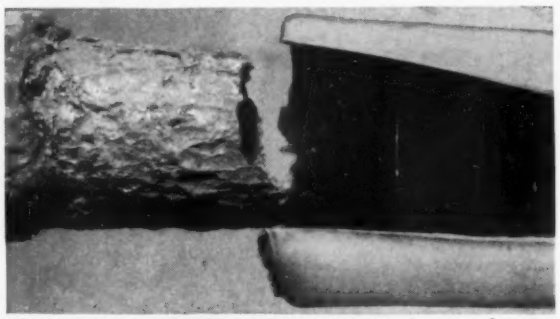


36-inch gas transmission pipe section being lined with Epon resin-based enamel which eliminates waxy build-up and greatly reduces effect of electrostatic corrosion.



36-inch transmission pipe sections lined with Epon resin-based *Copon* made by Coast Paint and Lacquer Company, Houston, Texas.

CORROSION IS



HOW X-TRU-COAT PREVENTS UNDERFILM MIGRATION. A section of coating was removed from this sample before it was subjected to an eight-month salt crock test. Corrosion ravaged the unprotected metal, but was unable to penetrate X-TRU-COAT's tight plastic-to-steel bond. Cutting back of the coating revealed *no underfilm migration!*

X-TRU-COAT's polyethylene coating is easily cut back for welding. Joints are economically protected with plastic tape or cold-applied joint compounds. Bright yellow color reflects heat. Coating remains at lower temperatures, retaining its tough, abrasion-resistant properties.

SEALED OUT . . .

with Republic X-TRU-COAT Plastic-Coated Steel Pipe

Republic X-TRU-COAT more than meets requirements of your most severe corrosion applications. You can bury it in soils of different potentials, subject it to stray currents, lay it in the most aggressive soil. High-density polyethylene coating *seals out* electrical and chemical corrosion.

The tough yellow jacket is continuously extruded over a special, pressure-sensitive adhesive to form a moisture-proof, elastic bond with the pipe. Polyethylene plastic was chosen because it is one of the most inert materials available. Provides outstanding electrical- and chemical-resistance, offers negligible water absorption. And, since polyethylene retains its flexibility even at low temperatures, the coating is not damaged by bending or flexing.

The steel pipe is Republic Continuous Butt Weld or Electric Resistance Weld—uniformly round, ductile, and strong. Republic's constant quality control assures precise line-up of joints; trouble-free bending in field or shop; complete, *line-long* dependability.

X-TRU-COAT Plastic-Coated Steel Pipe is available in a wide range of wall thicknesses and diameters (through 5⁹⁄₁₆″ O.D.). Delivered ready for installation, X-TRU-COAT withstands the abuse of shipping, loading, trucking, and handling without damage. Learn more about the plastic-coated pipe that *seals out* corrosion problems. Contact your local Republic Sales Office for complete details and specifications.

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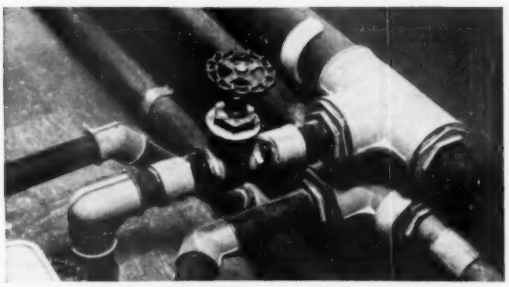
FOR NEW AND REPLACEMENT USE—service entrance lines of Republic SRK are gaining wide acceptance. Corrosion-resistant SRK saves time and money in new connections through its low initial cost and ease of installation. On replacement jobs, SRK is pushed through existing line from tap to riser, eliminating costly trenching.

REPUBLIC CONTINUOUS BUTT WELD PIPE is known for excellent in-service dependability. Tight galvanized coating resists corrosion. Uniform ductility and strength assure easy workability, fine threading characteristics. Sizes range from ⅛″ through 4″ nominal. Mail coupon for further information.



REPUBLIC SEMI-RIGID PLASTIC PIPE resists highly corrosive chemicals, prevents scale build-up, yet costs no more than ordinary pipe. SRK is easy to handle and install. Cuts with hand- or hacksaw. Joints are quickly and permanently welded with brush-applied solvent and plastic fittings. Send coupon for complete information.

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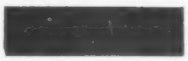
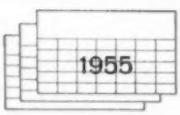
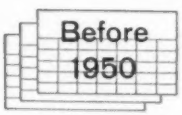
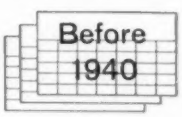
Company_____

Address_____

City_____ Zone____ State_____

THE UNVARNISHED FACTS

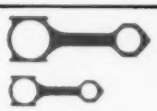
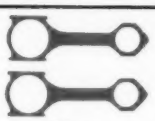
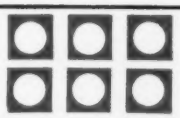
about engine compressors in the 375 to 950 hp range

FEATURE	WORTHINGTON SLHC	MFR. A	MFR. B	MFR. C
DESIGNED FOR TURBOCHARGING	Yes	No	No	No
SELF-SUSTAINED TURBOCHARGING	YES	NO	NO	NO
FUEL CONSUMPTION	7,000 BTU/BHP HR	9,000 BTU's	 8,600 BTU's	8,500 BTU's
CYCLE	4	2	2	4
CYLINDER ARRANGEMENT	Inline	Inline	Vee	Vee
RPM	450	600	450	400
YEAR ENGINE WAS DESIGNED	 1955	 Before 1950	 Before 1940	Before 1940
NUMBER OF DESIGNS TO COVER RANGE	1	2	2	2
LARGEST UNIT FOR SKID MOUNTING	950 HP	660 HP	1100 HP	660 HP

On these two pages you'll find a comparison of all the significant facts about gas engine compressors in the 375 to 950 horsepower range. We think you'll have to agree that Worthington's SLHC unit is the outstanding performer in its size range. Not only does it have 18% better fuel economy than the next nearest engine, but it also features self-sustained turbocharging, removable cylinder liners with cast-in water jacket, interchangeable power and compressor rods, and many other important engineering advances.

For complete details on the new SLHC engine compressor get in touch with your nearest Worthington district office. Or write to Worthington Corporation, Section 43-4, Harrison, N. J. In Canada: Worthington (Canada) Ltd., Brantfold, Ont.

WORTHINGTON

FEATURE	WORTHINGTON SLHC	MFR. A	MFR. B	MFR. C
MOUNT CYLINDERS ON BOTH SIDES	Yes	No	No	No
CYLINDER LINERS	Removable	Removable	NONE	NONE
INTERCHANGEABLE POWER AND COMPRESSOR RODS	Yes	Yes	No	 No
SIDE BY SIDE CONNECTING RODS	Yes	 Yes	No	No
FRAME CONSTRUCTION	En-bloc	En-bloc	Separate Cylinders	 Separate Cylinders
IGNITION	Twin	Single	Single	Single
RUNNING GEAR LUBRICATION	MANIFOLD CAST IN BASE	SEPARATE PIPE MANIFOLD	SEPARATE PIPE MANIFOLD	SEPARATE PIPE MANIFOLD
GASKET-FREE CYLINDER HEAD SEATS	YES	NO	NO	NO
RUNNING GEAR EASILY ACCESSIBLE	YES	NO	NO	NO

Twenty-eight miles out in the Gulf of Mexico, this 340-ft long special barge lays big-inch gas pipeline connecting new offshore reserves with Transcontinental Gas Pipe Line Corp's system (Contractor and owner of barge is Brown & Root Inc.) Sixteen inch pipe being laid is heavily coated with concrete. Far point on this Transco supply lateral is 38 miles from the coast. It was expected that by Oct. 1 gas from these offshore reserves would be flowing up the system to the New York City-New Jersey-Philadelphia metropolitan area.

Transco's newest offshore lateral slides into 90 ft of water in the Gulf of Mexico. The pipe later will be jetted-down under the floor of the Gulf.

This aerial view of the 340-ft laying barge shows most of the working area of the barge. Note the 360-ft twin-float "stinger" extending out behind the barge. It enables a proper lowering angle for the pipe to slide into the water. Each 40-ft joint of the coated 16-in. pipe weighs 7000 lb. This special work barge lays 100 joints each 12-hr shift.

Texas Gas-Texas Eastern transport service okay

Transportation plans of Texas Gas Transmission Corp. and Texas Eastern Transmission Corp. were approved by FPC (Dockets G-17335 et al, Opinion No. 327).

Facilities will be built to transport up to 100 MMcfd for the account of Hope Natural Gas Co., Clarksburg, W. Va.

Twenty-one producers planning to sell gas to Hope from fields in and offshore from Louisiana were certificated without price conditions. However, Texas Gas must file a single transportation service rate using a 6 per cent rate of return instead of the 6¼ per cent proposed. Texas Eastern's authorization was conditioned on a rate schedule. It must be fully supported by proper cost data, including a system-wide cost of service, and proper allocation between various services rendered by TET, including the new transportation service. The FPC said there "is no conclusive or substantial evidence . . . to support the 4.5 cents per Mcf which Texas Eastern proposed to charge Hope for transporting its gas."

Hope itself will produce about 4 per cent of the gas supply. The balance will be bought from the 21 producers under 26 contracts. These contracts call for initial prices of 21 cents per Mcf for about 5 per cent of the volumes dedicated. The rate is 21.5 cents for the remaining 95 per cent.

Major part of actual construction falls to Texas Gas. It includes 165 miles of 30-in. loops and 81 miles of 26-in. loops; 104 miles of various size supply lines; 14,000-hp added compressor capacity; and a new 1760-hp station. Building site is along the company's system in Louisiana, Arkansas, Mississippi, Tennessee, Kentucky, Indiana, and Ohio. Cost is estimated at $40 million.

Texas Gas will deliver the gas to Texas Eastern at their existing interconnection near Lebanon, Ohio.

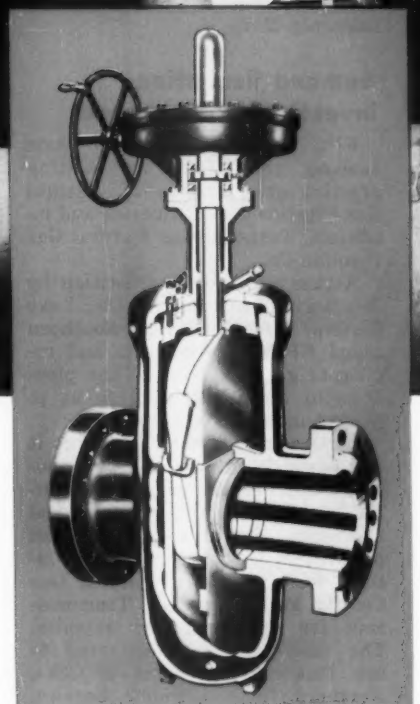
From Lebanon, TET will deliver the gas to Hope, or its Consolidated Natural affiliates, at existing connections.

Texas Eastern was told to put in service about 189 miles of existing 20-in. line from Middletown, Ohio to Moundsville, W. Va.; 6900-hp in existing compressor capacity; and to add 3100 compressor hp at existing stations. This reactivation and construction will cost about $2.2 million.

New FPC maps available

The June 30, 1959 revision of the FPC's map of "Major Natural Gas Pipelines" has been issued. Existing or proposed pipeline systems of about 111 companies are shown. In addition, the map shows natural gas fields, indicating both major sources and generalized areas of supply. Copies are available from the FPC, Washington 25, D.C., at 25 cents each. Order number is FPC-M-55.

"On-the-line overhaul saves time, saves money"



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PG&E's plan for Canadian gas to be heard

FPC will begin hearings on Oct. 15 on Pacific Gas Transmission Co.'s plan to import 456 MMcfd from Canada for delivery to California (Docket G-17350 et al). Pacific Gas Transmission will deliver the gas to its parent, Pacific Gas & Electric Co., San Francisco.

Also involved are filings by Pacific Northwest Pipeline Corp. and Montana Power Co., who also seek FPC okay for importing Canadian gas.

Pacific Transmission's plans cover 614 miles of 36-in. line and three mainline compressor stations totaling 27,500 hp. Total cost: $129.5 million. Pipeline route would be from the International Boundary near Kingsgate, B. C., to the vicinity of Klamath Falls, Ore., on the Oregon-California border.

The PG&E affiliate also would transport daily volumes up to 151.7 MMcf which Pacific Northwest plans to buy from Westcoast Transmission Co.

Alberta & Southern Gas Co. Ltd. would buy the gas in Alberta. Then, the gas would be transported by Alberta Gas Trunk Line Co. Ltd. to a point near the Alberta-British Columbia boundary. Alberta Natural Gas Co. would pick up the gas and move it to the International Boundary, where it would be bought by Pacific Gas Transmission.

The Pacific Northwest gas from Westcoast would be delivered at Kingsgate to PGT for the account of Pacific Northwest and transported to Spokane, Wash. for delivery. Pacific Northwest will build about 17 miles of lateral lines to take the gas from PGT. Pacific Northwest will spend $2.3 million on these facilities. Pacific Northwest also plans to sell up to 150 MMcfd to El Paso Natural Gas Co. at Ignacio, Colo.

Montana Power's plan: buy 30 MMcfd from Canadian - Montana Pipeline Co. at the U. S.-Canada border in Glacier County, Mont. Montana will have to build 51 miles of 16-in. line to take the gas. Cost: $2.5 million. Canadian - Montana would buy the gas in Canada from Alberta & Southern. Alberta Trunkline would transport the gas for the account of Canadian-Montana.

CIG not a public utility

Colorado Interstate Gas Co. is not a public utility. This ruling was made by a Colorado Springs district judge. He had been asked to set aside a ruling by the Colorado PUC that the company was a public utility.

The commission's ruling would have given the PUC regulatory powers over the direct sale of natural gas by CIG.

The Colorado commission will appeal the decision to the state supreme court.

Am-La construction okay

American Louisiana Pipe Line Co. can build, but not operate, new facilities in Louisiana and Tennessee (Docket G-18312). The company will build an 8000-hp compressor station in Louisiana and a 10,000-hp station in Tennessee at a cost of $6 million. The new facilities will add 3 MMcfd to American Louisiana's system.

Southern Natural's major expansion okayed

FPC approved Southern Natural Gas Co.'s plan to expand its system at a cost of $52 million (Docket G-9892 et al). Also approved was the price Southern Natural plans to pay for gas to supply the system. Gas will come from five fields in Louisiana and Mississippi.

Initial prices proposed by producers ranged from 19 to 21.5 cents, plus tax. Exceptions to an earlier decision by a presiding examiner questioned whether these prices were in the public interest in light of the Supreme Court's CATCO decision.

FPC concluded that requirements laid down by the CATCO opinion have been met in this case. ". . . It is clear that there is no warrant or justification for the attachment of any initial price condition in this case," the commission said. Further, the prices Southern would pay in some southern Louisiana fields are "well below" the recently negotiated prices in south Louisiana.

Producer prices would increase Southern's weighted average unit cost of gas by only .05 cents per Mcf. This small increase, the FPC said, is insufficient to outweigh the benefits.

Southern will build about 590 miles of various diameter loop lines. The 8000-hp compressor boost will increase maximum delivery capacity from about 990 MMcf to 1365 MMcfd.

At the same time, FPC okayed South Georgia Natural Gas Co. to spend $1.9 million to increase its firm service to 15 existing customers, initiate new service to six Georgia towns, and serve three industrial consumers on an interruptible basis.

Producer sales to Transco approved

Two producers can sell gas to Transcontinental Gas Pipe Line Corp. without initial price conditions (Dockets G-14753, 16380, and 16387). The producers are Sunray Mid-Continent Oil Co. and Superior Oil Co.

Facts of record lead FPC to conclude that the requirements laid down in the CATCO decision have been met in both producer cases.

Sunray's southern Louisiana sale calls for an initial price of 21.5 cents per Mcf. Periodic escalations will raise the price to 29.5 cents in 1974. Dedicated reserves total 27.4 billion cu ft.

Superior will sell gas from offshore Vermilion parish at 21.4 cents per Mcf.

Demand limitation investigation launched

FPC is investigating the state demand limitations in existing practice or contracts of Natural Gas Pipeline Co. of America and its affiliate, Texas Illinois Natural Gas Pipeline Co.

Action is based on a petition by Wisconsin Southern Gas Co., Lake Geneva, Wis. Wisconsin Southern asked FPC to investigate and reallocate gas delivered by the pipelines to their customers so as to avoid "undue preference."

Wisconsin Southern said that it and some 20 other small distributors who purchase gas from Natural and Texas Illinois had critical shortages. But, the three largest purchasers have been able to contract with Northern Natural Gas Co. and Midwestern Gas Transmission for additional gas supplies. The three customers referred to are Peoples Gas Light & Coke, Northern Indiana Public Service, and Northern Illinois Gas.

Wisconsin said the small firms will be at a disadvantage because the larger companies obtained the added gas. Also, Wisconsin contends that Natural refused to transport gas which Midwestern was willing to sell to Wisconsin.

The pipelines, however, charged that if Wisconsin Southern is short of gas, it is because it failed to comply with orders of the Wisconsin PSC restricting new space heating customers.

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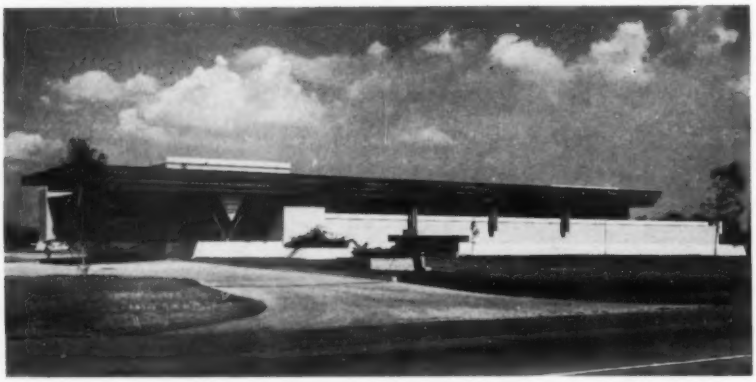

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Michigan-Wisconsin gets demand-commodity rate

FPC Presiding Examiner Samuel Binder approved a demand-commodity form of gas rate for Michigan Wisconsin Pipe Line Co. This replaces its present straight commodity rate. It also allocates an added 40 MMcfd to the company's present customers (Dockets G-17512, 13246, et al).

Two decisions were filed. One lets Michigan substitute its two-part rate for the straight commodity rate, in effect since the company began operations. The other allocates the 40 MMcf on the basis of this proposed demand-commodity tariff. The two cases were not consolidated. Separate hearings were held.

The two-part tariff is designed to yield total revenues about equal to those provided under the straight-line rate of 37.5 cents per Mcf. The new tariff provides for a monthly demand charge of $2.62 per Mcf and a 24-cent commodity charge.

In the other case, Binder approved Michigan's plan for allocating an additional 50 MMcfd from the Laverne Field in Harper County, Kan. This is on the basis of the two-part rate.

FPC previously gave Michigan temporary authority to build 353 miles of line and 16,560 hp in compression to move the 40 MMcf from Laverne. Binder's decision grants a permanent certificate for these facilities, as well as for about 21 miles of line in Wisconsin. It also approves construction of 3720-hp in compressor capacity.

Allocation of the 40 MMcf includes an added 14 MMcfd for Michigan Consolidated Gas Co. Ten million of this would be used to help make up for the gas no longer received from Panhandle Eastern Pipe Line.

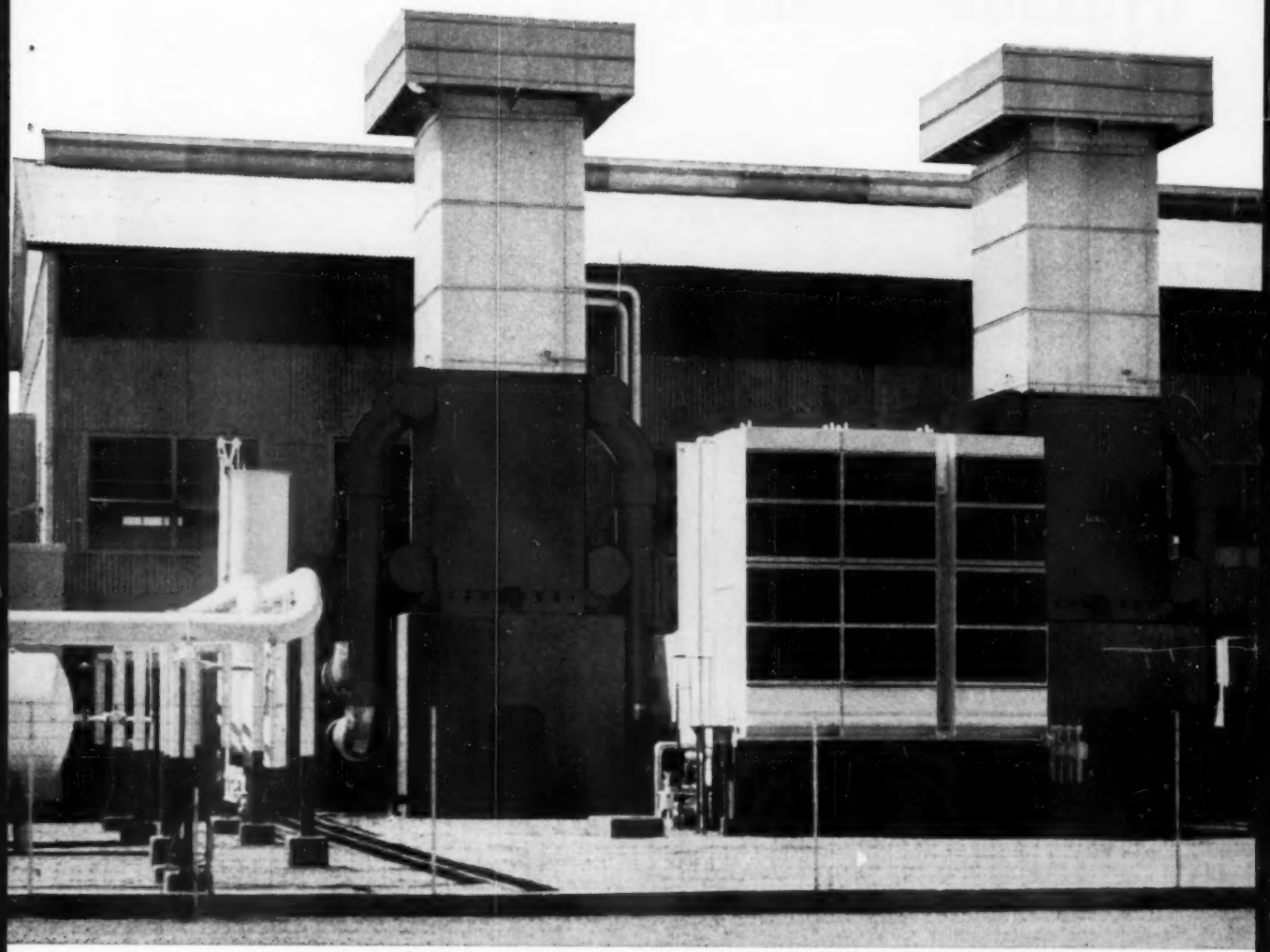
Binder also denied four requests seeking gas supplies from Michigan Wisconsin for service to new markets.

New service planned

Northern States Power Co. has started a $9.5 million construction program in Minnesota and Wisconsin. Gas service will be brought to 21 communities.

Money breaks down this way: $1.5 million in the Stillwater (Minn.) division this year; $253,000 in Hudson and North Hudson (Wis.) this year; and $2.7 million in 1960 in the St. Cloud and Winona, Minn. and LaCrosse, Wis. areas.

IT TAKES LESS THAN 500 MANHOURS TO INSTALL A **FIN-PAK®**



Dual Fin-Pak heat exchangers at El Paso Natural Gas Company's compressor station at Caprock, New Mexico. The two 5,000-hp gas turbines at the Caprock station pump an average of 12,000 CFM, 24 hours a day.

Fin-Pak's prefabricated design, light weight and compactness cut installation time and labor costs to a minimum. On a typical 5,000-hp gas turbine cycle, for example, fewer than 500 manhours are required for *complete* installation of a Fin-Pak.

And installation economies are just the beginning. In operation, a Fin-Pak can cut your fuel bill by as much as 32%*, because it recovers up to 80% of the heat from the turbine exhaust and returns it to the combustion air.

And maintenance is a cinch with the Fin-Pak. It has short, straight-through passages. Occasional cleaning with compressed air is *all* the maintenance a Fin-Pak needs. **One last thought:** a gas turbine station requires about 80% *less* plant maintenance personnel than a station of equal capacity operating diesels, steam turbines or gas engines. For complete details, call or write Air Preheater.

*A Fin-Pak with a designed efficiency of 75% in a gas turbine cycle at 6 to 1 pressure ratio and a turbine inlet temperature of 1500°F.

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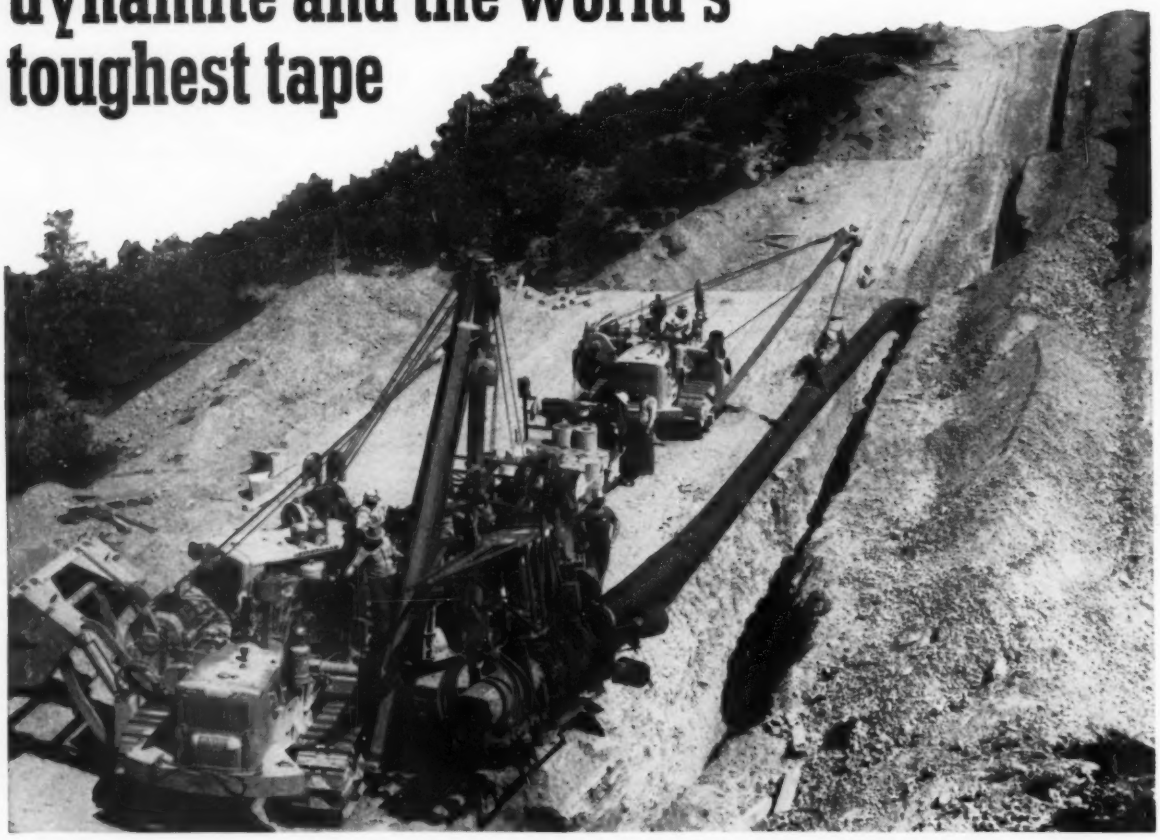

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The line runs from sea level to points up to 8,300 feet in the mountains of Southern California, with grades over 40%. In places the trench was blasted out of solid rock. It took rugged crews to put the line in and a rugged tape to protect it.

On the recent big Florida Line and other lines in America, on lines in Canada and in Iran, Polyken has proven itself the most practical and economical protection you can put on a pipe.

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Polyken Tapes can be applied swiftly, easily, effectively, even under extreme conditions. This mountain-country coating went on with flat-country simplicity. That's why more contractors and pipeline managers are specifying Polyken.

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Farwest Corrosion Control Corp.

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Pacific Water Works Supply Co.

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New concept developed in gas turbine field

A major advancement in the industrial gas turbine field has been made. Announcement comes from E. L. Miller, president of Cooper-Bessemer Corp., and Leonard C. Mallet, general manager of Pratt & Whitney Aircraft.

The new concept is based on a modified Pratt & Whitney Aircraft J-57 jet engine. It will drive a Cooper-Bessemer-designed gas turbine, thus converting the jet's massive thrust into commercially usable horsepower. An experimental prototype of the complete gas turbine unit is under construction at the Mount Vernon, Ohio plant of Cooper-Bessemer.

The J-57 is the power plant for America's jet commercial fleets and advanced military aircraft. By modifying the J-57 engine, hot compressed gases that normally provide enormous thrust will be harnessed by the C-B gas turbine for conversion into rotative horsepower.

An initial use of this new gas turbine engine will be for moving natural gas through cross-country pipeline systems. For this service, the new turbine is coupled to a centrifugal compressor.

Several technical obstacles had to be overcome in converting an aircraft's engine thrust to stationary horsepower.

The J-57, which normally burns conventional jet fuels, for example, was converted to burn natural gas taken directly from the main pipeline on which the unit is pumping gas.

R. L. Boyer, Cooper - Bessemer vice president and director of engineering, originally conceived the possibilities of this undertaking. He said "it can be anticipated that this experimental project will result in great operating economies compared with any gas turbine now in use, particularly in the area of installation and maintenance costs. The first turbine, a 10,500-hp unit . . . will be ready for field installation early in 1960."

New reserves for Texas Illinois

Texas Illinois Natural Gas Pipeline Co. is adding facilities to receive additional gas from reserves in south Texas (Dockets G-14829, et al).

The FPC also granted a certificate to South Texas Natural Gas Gathering Co. This certificate covers new facilities, the sale to TING, and producer sales to South Texas. South Texas also will transport gas that Texas Illinois will buy from Shell Oil Co.

Examiner Woodall did not attach any price conditions. The four producers' prices range from 14.5 to 16 cents per Mcf; Shell's initial price is 18 cents. South Texas will charge 1.5 cents per Mcf for transportation and will sell gas to Texas Illinois at an initial price of 19.5 cents. FPC staff suggested producer certificates be conditioned to limit initial price to 15 cents.

Texas Illinois' construction was covered by two filings. One covered 2000-hp additions to eight mainline stations to up system capacity by 20 MMcfd to 524 MMcf. Cost: $3.9 million. In the other, Texas Illinois planned 10 miles of 8-in. line in Hidalgo and Starr Counties, Texas. Cost: $234,700.

Court fight faced by new Texas tax

Pipeline companies, among others, are threatening to take to court Texas' new tax on gas.

They want the "severance beneficiary" tax of 1.5 per cent of the market value of gas to be voided as unconstitutional. The tax is expected to yield about $8 million a year.

Under the tax, the severance beneficiary is said to be the "first purchaser" of the fuel from the producer. Opposition claims that under the state constitution, gas severance taxes cannot be imposed on any transaction other than the actual withdrawal of the fuel from the ground. Texas already imposes a 7 per cent production tax on the market value of gas, paid by the owner and lessees of the land.

"Age of Illumination" published by API

The eventful 40 years of progress that marked the exciting growth of the American petroleum industry before the turn of the century are spotlighted in "The Age of Illumination." This is the first of a two-volume history recently completed under joint sponsorship of the American Petroleum Institute and Northwestern University.

Harold F. Williamson, of the university's Department of Economics, and Arnold R. Daum, research associate, did years of intensive research into original source materials in writing the 870-page book.

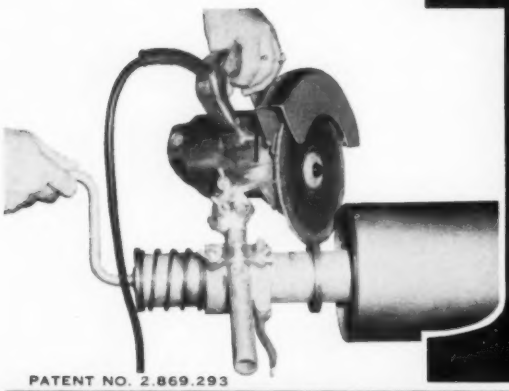
Sales agreement signed

Coastal States Gas Producing Co. and Associated Oil & Gas Co. have entered into an agreement for sale of natural gas.

Coastal States will build a line from the Associated field in Jim Wells county, Texas to the South-Tex Corp. gas processing plant west of Corpus Christi. There, Associated will deliver residue gas to Coastal after removing liquid hydrocarbons. Pipeline capacity will be 100 MMcfd. The agreement calls for dedication of 800 billion cu ft to Coastal States.

Bound for French North Africa are these five trailer truck loads of pipeline construction equipment. M. J. Crose Mfg. Co., Tulsa, fabricated the $250,000 shipment headed for Tunisia to speed construction of a 24-in., 476-mile gas line from Cekhira, Tunisia to Edjeleh, Algiers. In the photo are Crose men (from left) Loyd Partney, assistant shop superintendent; Bill Handwerk, chief engineer; John W. Brand, vice president; and John Manley, export sales manager. Included in the equipment are the completely automatic Crose-Price-O-Matic pipe double jointing unit, cleaning and priming, and coating and wrapping machines.

another H&M 1st



the H&M "BEVEL-LAND" GRINDER

PATENT NO. 2,869,293

automatically cleans and lands pipe bevels

The new H & M "BEVEL-LAND" GRINDER employs an electric grinder to automatically clean and smooth pipe cuts and put the land on bevels. The new machine eliminates the old, time-consuming method of using a file and hammer for this work.

The new H & M "BEVEL-LAND" GRINDER may be placed on the pipe and in operation in less than **one minute.** A simple adjustment in angle of the grinding wheel is all that is required to change the machine from the cleaning to the land position.

The H & M "BEVEL-LAND" GRINDER assures more positive alignment of pipe and better quality welds. The machine is available in two models: one for 6" to 14" and one for 14" to 36" pipe.

Write for your copy of the new H & M Brochure which illustrates the features of this new machine . . . another H & M FIRST in the field of pipe cutting and beveling equipment.

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TULSA, OKLAHOMA

GAS editor vacationing . . . not FPC

It was a GAS editor on vacation —not the FPC. . . .

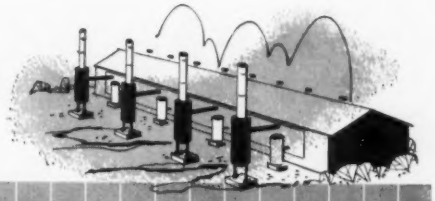
At least, that's the way it looks after hearing from FPC Chairman Jerome K. Kuykendall regarding the lead story in August Highlights (p. 8).

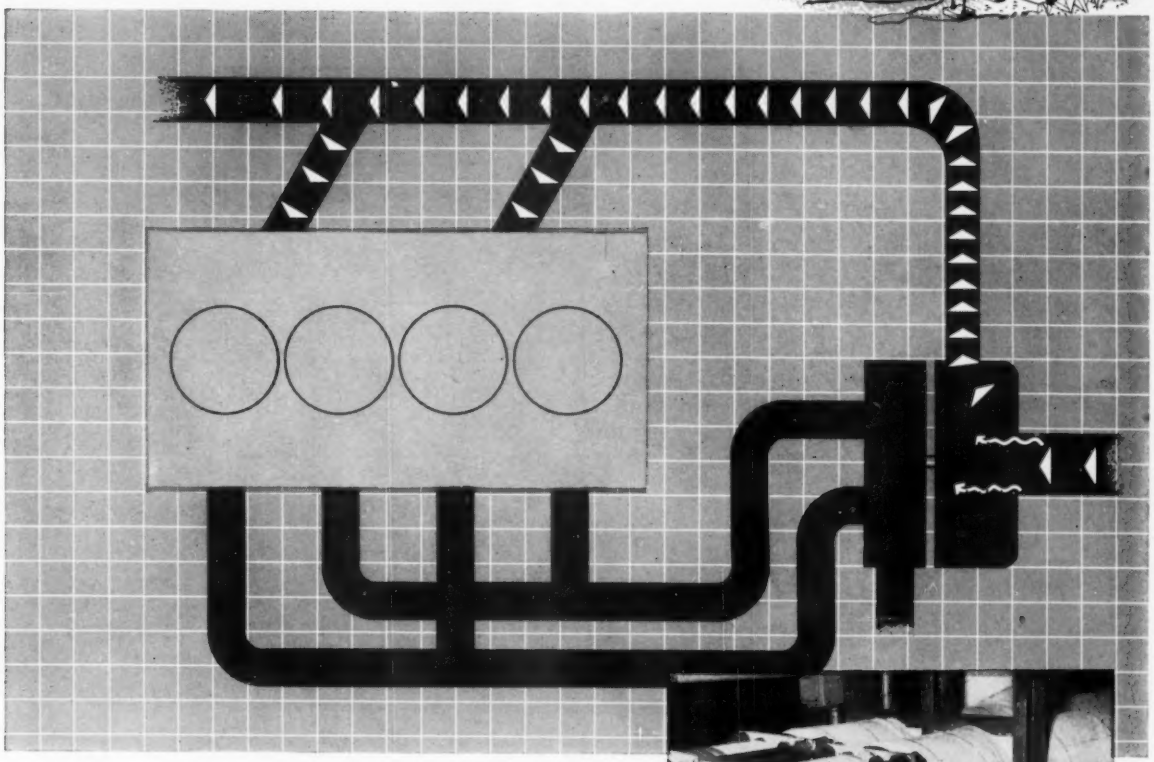
There we said "Transwestern Pipeline Co. won't get its certificate before September at the earliest, despite Presiding Examiner Frazee's recommendation for approval. . . ." And we concluded, "Now with the commission ready to take its annual vacation during August, no decision will be forthcoming until September or later."

We couldn't have been more wrong: The FPC issued a certificate of public convenience and necessity to Transwestern on Aug. 10. And, the commission does not and never has taken an annual vacation during August nor during any other month of the year. We have pretty strong evidence on hand right now that the FPC is in session during August. GAS recorded 25 FPC releases in the period from Aug. 3 to Aug. 25.

Flexonics

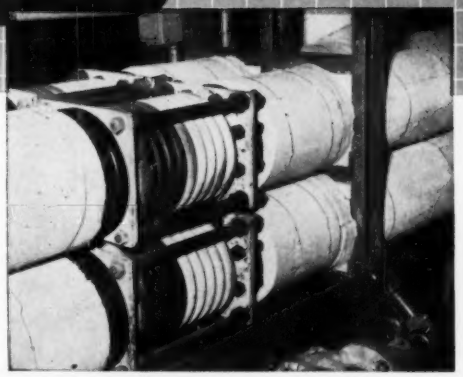
has the engineering experience to help you solve exhaust expansion problems when you turbocharge compressors





Here's a lively subject – *increasing gas pipeline capacity by turbocharging existing compressors in the field.* If you want the answers to the expansion problems that arise when the exhaust piping becomes an integral part of the operating loop, call on FLEXONICS engineers. They have the *specific* experience in this field that can mean actual dollar savings to you.

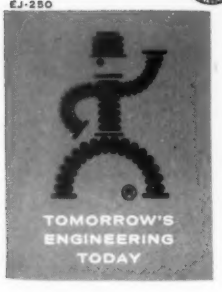
Write today for your free copy of this easy-to-read report. It tells you the dollars-and-cents facts that led an important pipeline company to a complete turbocharging program.



Special-design FLEXONICS Expansion Joints in the exhaust piping of a newly turbocharged compressor station.

Member Expansion Joint Manufacturers Association

EJ-250



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Michigan Wisconsin Pipe Line Company...

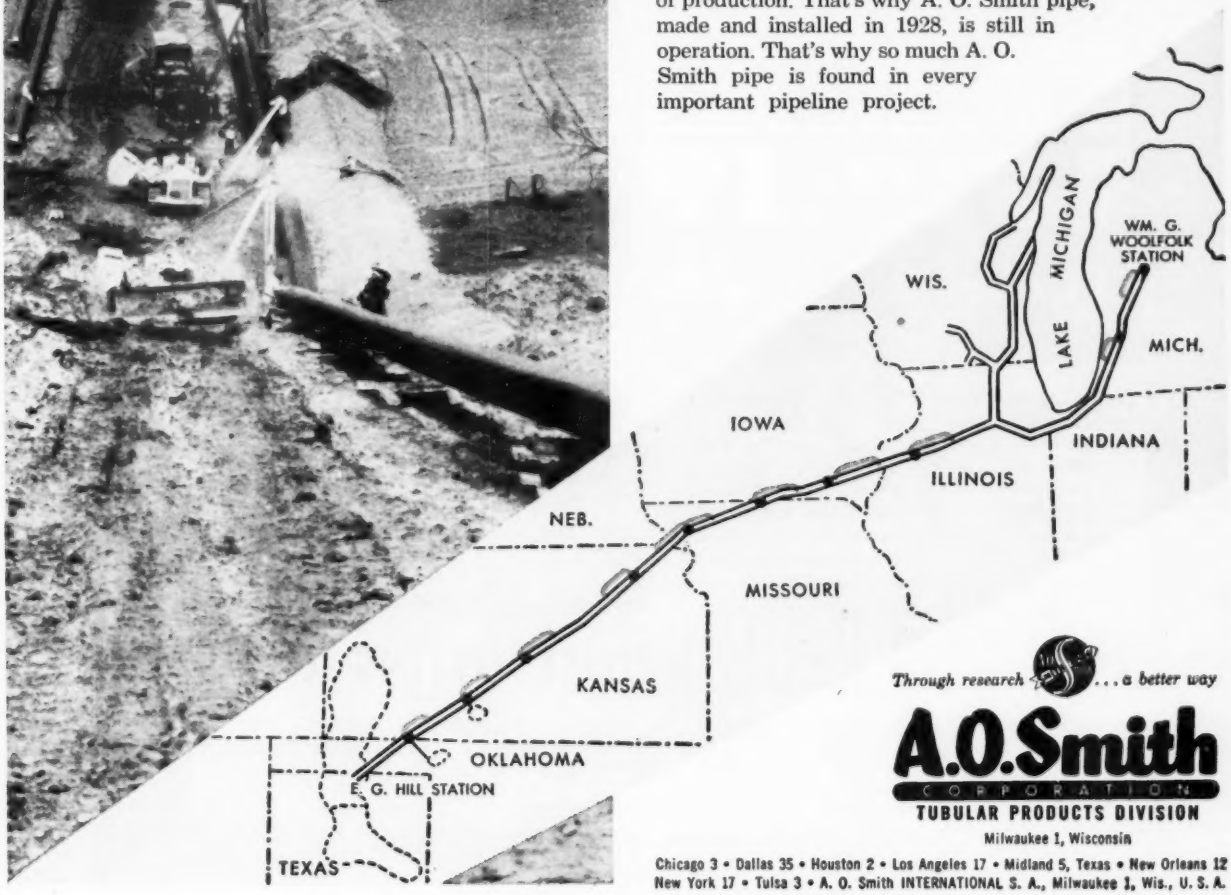
loops for

larger volume

374 miles of looping spans midwest...swells main line capacity for average day by eighty million cubic feet of natural gas

During July, Wisconsin and Michigan gained an added eighty million cubic feet of natural gas daily — through new loops paralleling Michigan Wisconsin Pipe Line Company's main line. Between the Laverne field in Harper County, Oklahoma, and the W. G. Woolfolk Station near Big Rapids, Michigan, 374 miles of 24-inch pipe were laid — all furnished by *A. O. Smith*.

For almost 30 years . . . A. O. Smith line pipe has always been manufactured to a high standard of quality . . . precisely controlled at every step of production. That's why A. O. Smith pipe, made and installed in 1928, is still in operation. That's why so much A. O. Smith pipe is found in every important pipeline project.



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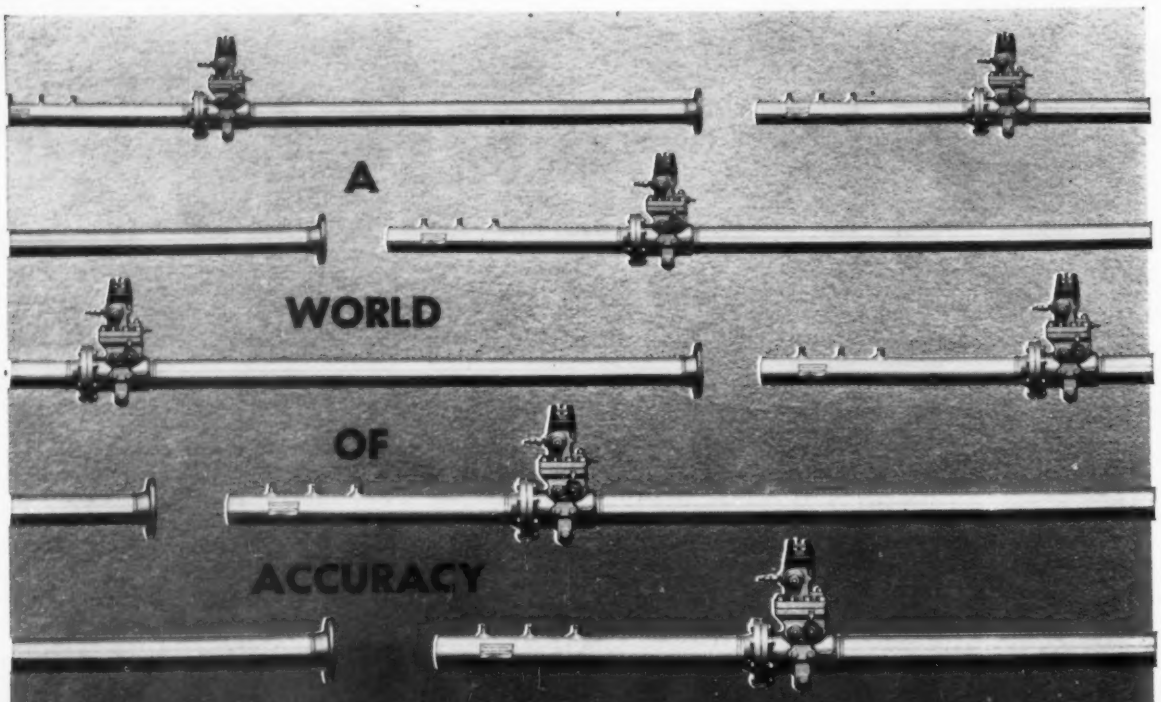

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132

Special group formed

A special engineering group for industrial control systems has been set up within RCA's Electronic Data Processing Division.

Manager of digital control systems engineering is R. W. Sonnenfeldt.

Formation of the group is a further step in RCA's program of offering customized process computers, supervisory control systems and data logging systems using many standard circuit modules developed for the RCA 501, an all-transistor electric data processing system.

San Diego gets gas boost

A new 14.4-mile line will augment Southern Counties Gas Co.'s deliveries to San Diego (Calif.) Gas & Electric Co. The 24-in. line, paralleling the 35-mile existing system, is slated for completion Nov. 1.

SoCounties Vice President J. A. Millen said the new system will have a potential 142 MMcfd capacity.

GAS • Pipeline Notes

Kansas - Nebraska Natural Gas Co. won approval of its plan to construct about 15.5 miles of 12-in. line in Kansas. Also approved under Docket G-17839: 1000-hp addition to Holcomb compressor station and a new 1800-hp station at Quinter. Cost is an estimated $1 million.

United Gas Pipe Line Co., Shreveport, got FPC's okay of its plan to install 8.4 miles of 16-in. lateral lines. The new line will enable United Gas to connect added gas supplies from the Lapeyrouse area of Terrebonne parish, La.

Dresser Industries Inc. is moving its Turbodrill division to the Dallas plant of the Security Engineering division. For nearly three years, Turbodrill was located on the grounds of the Guiberson Corp., also one of the Dresser Industries.

More gas will be delivered to Toledo and other northwestern Ohio communities through a new Ohio Fuel Gas Co. line. The company is spending $680,000 in Seneca county on a 24-in. 9.2-mile line.

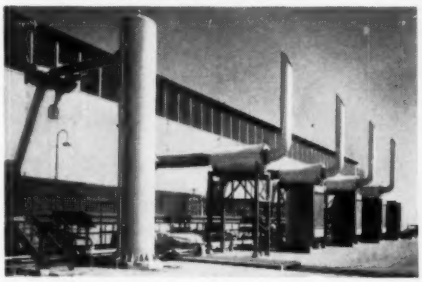
FPC approved United Fuel Gas Co.'s construction of 4.8 miles of line and 8400-hp compressor capacity (Docket G-18550). Cost will be $3.5 million. This project is part of an overall plan to replace portions of a low pressure transmission system in West Virginia.

Mountain Fuel Supply Co., Salt Lake City, has FPC approval of its plan to build 24.4 miles of 20-in. loop (Docket G-18254). The $1.5 million job will be in Summit county, Utah, and Uintah county, Wyo.

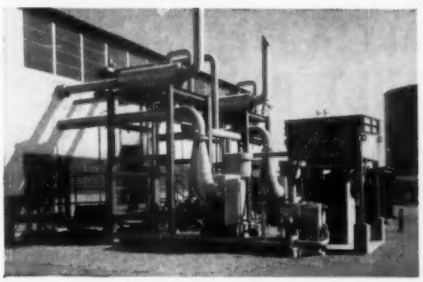
Cities Service Gas Co.'s Docket G-18868 has FPC blessing. It covers 8.4 miles of 20-in loops in Franklin county, Kan.; 1.7 miles of 20-in. loops in Cass county, Mo.; 340 hp addition at Knobnoster station in Johnson county, Mo.; and 4.5 miles of 16-in. line also in Johnson county. Cost: $817,000.

Ohio Fuel Gas Co. has a certificate enabling it to make better use of its Pavonia storage field capacity in Richland county, Ohio. Docket G-18252 covers 6.4 miles of 24-in. line in Licking county and 1500 additional hp at the Pavonia compressor station. Cost: $865,000.

COMPRESSORS AND



GENERATORS ARE



MAXIM-QUIET

The new Needles, California Compressor Station operates with quiet efficiency. Maxim Silencers cut down exhaust noise and intake pulsation to the minimum. Specify the world's most widely used silencer—a Maxim. There's no quiet like *Maxim-Quiet.*

Photos courtesy of Southern California and Southern Counties Gas Companies

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Please send me bulletins on Maxim Silencers for

- ☐ Waste heat recovery
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- ☐ Internal combustion exhaust and intake
- ☐ Air compressor intakes and discharges
- ☐ Blower intakes and discharges

name

company

address

GAS Pipeline People

New vice president—sales and rates—of Southern Natural Gas Co., Birmingham, is MARC BAUM, until now manager of the company's sales and rate department. Also, WILLIAM S. TARVER was elected secretary of the company and PETER G. SMITH was named an assistant secretary.

Marc Baum
Southern Natural

William Tarver
Southern Natural

Peter Smith
Southern Natural

N. C. Turner
Transwestern

N. S. TURNER has joined Transwestern Pipeline Co., Houston, as vice president in charge of engineering and operations. With Hudson Engineering Corp. for the past 12 years, Turner most recently was vice president.

DALE L. BUNDAY is national product planning manager for the two-way radio equipment engineered by the General Electric communication products department in Lynchburg, Va. He succeeds ROBERT L. CASSELBERRY, who recently was named acting manager of G-E's technical products operation at Syracuse, N. Y.

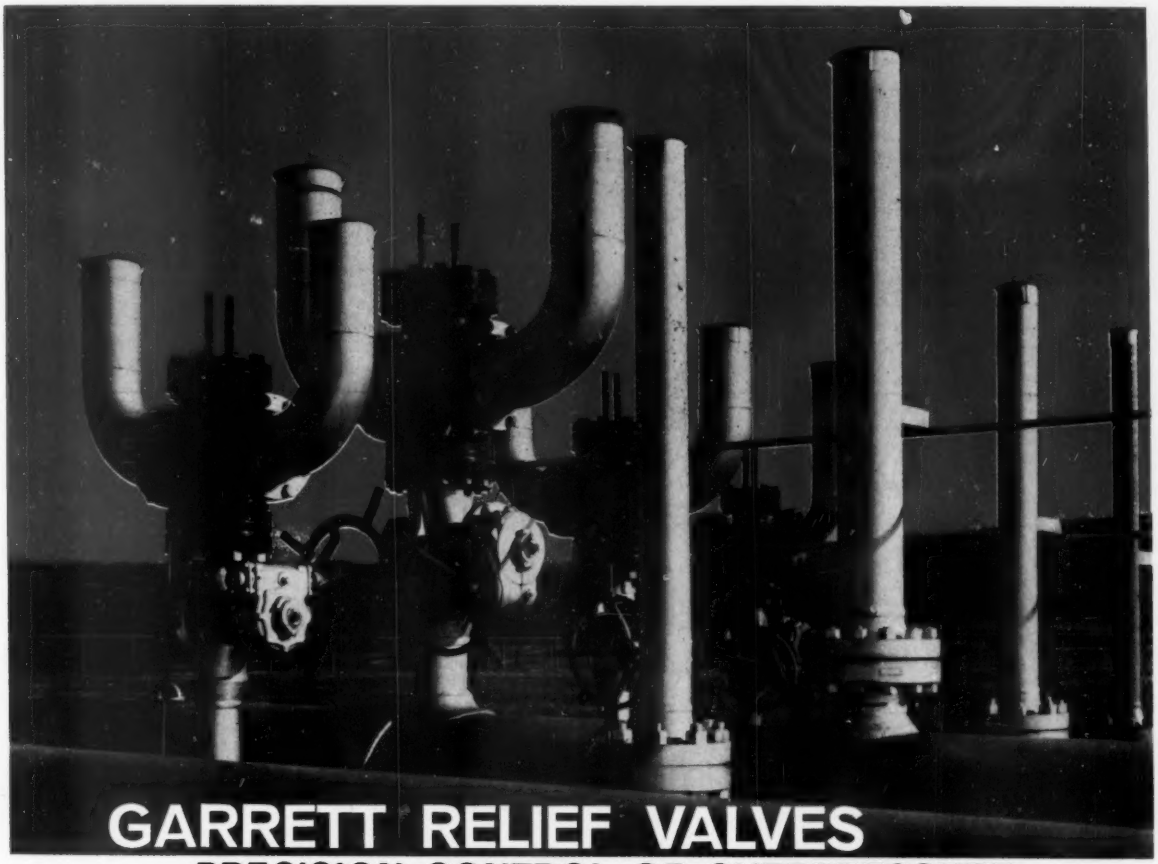
DONALD L. REED has been appointed manager, packaged compressor sales, of Cooper-Bessemer Corp., Mount Vernon, Ohio. Reed will retain his responsibilities as product manager for gas engine compressor sales. Cooper-Bessemer also announces the assignment of DONALD E. DIXON to its Houston branch office as sales engineer.

E. E. EUTSLER has been elected president of F. H. Maloney Co., Houston. He succeeds F. H. MALONEY, who becomes chairman of the board. The board also named H. B. FINCH secretary-treasurer, succeeding Eutsler. Finch and vice president JAMES H. MCBRIEN, general sales manager, were named to the board. Eutsler continues as the company's general manager. Finch is controller. Maloney also named LEE DAWSON JR. as manager of the Tulsa office. He formerly was production expediter in Houston.

Dale Bunday
G-E

Donald Reed
Cooper

PROVED BY MILES & MILES & MILES &



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Less than 1 percent of pressure differential will actuate a Garrett Relief Valve. This exactness of control is maintained over hundreds of reset cycles.

When conditions change or the valve is used on other service it can be readily adapted to new set and blowdown pressures. The valve body is not removed from the line to test or reset pressures. Servicing is equally easy and can be done with ordinary hand tools and wrenches without removing the valve from line or vessel.

Automatic blowdown service or safety shutdown can be provided for all Garrett Relief Valves already installed or furnished for new installation.

Garrett field engineers are available to assist in planning your relief valve requirements, write or phone.

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Garrett Oil Tools

DIVISION OF U. S. INDUSTRIES, INC.

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Allan Edwards Inc., Tulsa, has promoted B. B. PETTIGROVE to general sales manager and J. W. RODGERS to Dallas area district manager. JOE L. CREED has joined the company's staff of sales engineers.

B. B. Pettigrove
Allan Edwards

J. W. Rodgers
Allan Edwards

Joe L. Creed
Allan Edwards

Several appointments were announced recently by Foxboro (Mass.) Co. R. F. SUTTON is branch manager at Philadelphia; T. A. JONES is branch manager of the Atlanta office: F. H. LEATHERS, regional engineer for the southeastern states; G. W. HOWLETT, sales engineer at Pensacola, Fla.; and L. L. HODGES, sales engineer at Mobile, Ala. Sutton formerly was a sales engineer in the Pensacola office while Jones served in the same capacity at the Charlotte, N. C., office.

ARTHUR E. BRYAN and GLADYS M. JURCHAK have been named assistant corporate secretaries of Transcontinental Gas Pipe Line Corp., Houston. Bryan is also assistant treasurer. Since 1950, Miss Jurchak has been executive secretary to Tom H. Wheat, Transco corporate secretary. She is a member of the Houston and Texas bar associations.

Motorola Communications & Electronics Inc. has set up a new sales region in the Pacific Coast. JOHN M. KOBIELUS is its manager with headquarters in Los Angeles. The new area covers part of southern California, Arizona, and part of Nevada.

Cooper-Bessemer Corp., Mt. Vernon, Ohio, has formed a new sales district and named F. M. DEVIN vice president and district manager. The new district is a consolidation of the western Pennsylvania and Ohio areas. As the east central district, it is composed of three individual territories. Working under Devin in the new district are R. L. REYNOLDS, Grove City (Pa.) branch manager; J. R. CRAINE, Mt. Vernon (Ohio) branch manager, and J. M. BRANNAMAN, Pittsburgh branch manager.

John Kobielus
Motorola

F. M. Devin
Cooper

"serving all pipelines"

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FORMULA 291

Skin Saver

*Fieldjointer Patent # 2763047

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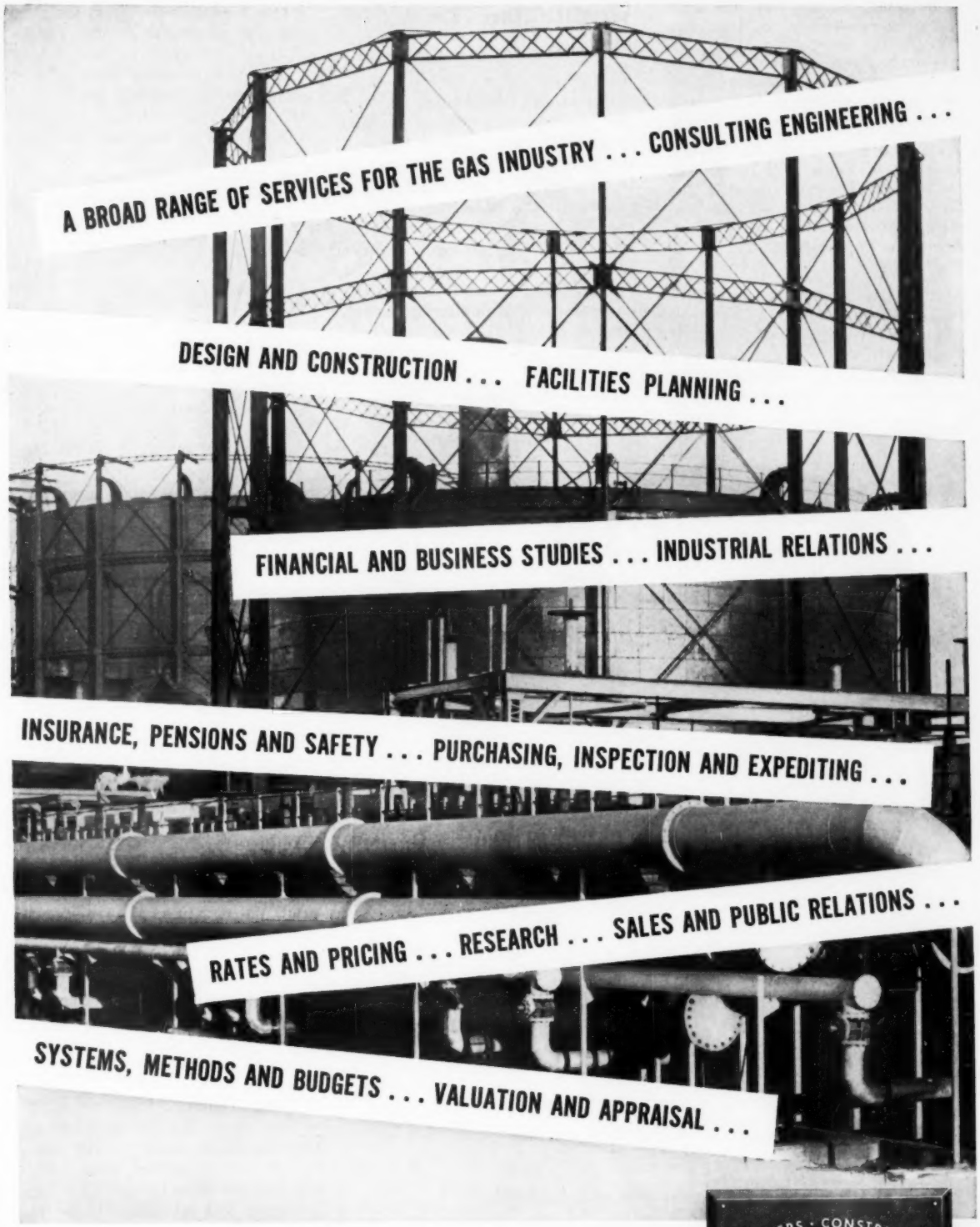
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JOHN E. GABRIELSON has been named sales engineer in Salt Lake City by the Bristol Co. Until his present assignment, Gabrielson was in the company's application engineering department in Waterbury, Conn.

DONALD B. EDWARDS has opened an office in Tulsa as a consultant on natural gas and natural gas liquids. He recently resigned as sales superintendent with Pan American Petroleum Corp.

KEN KENDALL has joined the Los Angeles sales staff of Daniel Orifice Fitting Co. Most recently Kendall was with Rockwell Manufacturing Co.

Washington • *Cont'd.*

from page 21

Old catch phrases such as "special privilege rich robber gas and oil barons," and "unfair competitive advantages" will be dusted off to make election-year headlines.

Because the basis for depletion is a fairly sophisticated economic principle, it will be much tougher for the industry to drum up public support. This, matched with the still unfavorable public impression left from the incidents involving Sen. Case and Texas gasman Porter in recent years, build a strong case for pessimism for the gas industry in Congress in 1960.

The first concrete hints of how badly the industry will fare before the lawmakers next year will come this fall during hearings and panel discussions before the House Ways and Means Committee. Depletion rates will be one of the first problems taken up in the Committee's study of all present tax laws.

The study opens Nov. 2 and will run into next year before the Committee begins drafting what it plans will be a far-reaching revision of the tax laws — including possibly some tax cuts. Even if the Committee upholds present depletion rates, there will be a strong attack on the floor of the House and in the Senate, Capitol insiders say.

The outcome could materially change the course of the gas industry by injuring its ability to compete with other fuels.

CANADIAN gas for the upper Midwestern areas of the United States is still some time away.

Federal Power Commission officials don't expect current hearings on requests to import Canadian gas to result in a decision until about the first of next year.

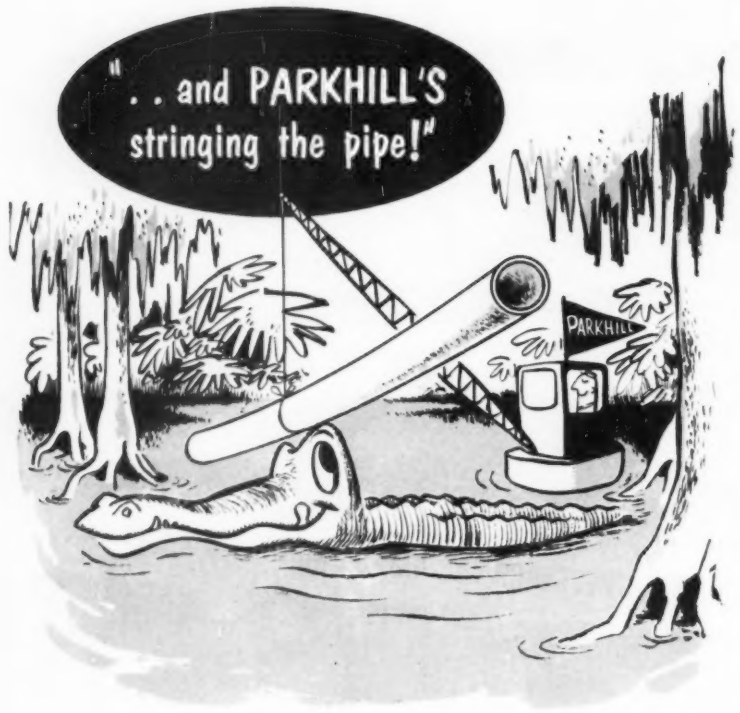
How long it will take for the new Canadian Energy Resources Board to complete action on requests to export the gas is anybody's guess.

It's another case where seller and buyer are ready to roll, but government bureaucrats aren't ready to fire the starting guns yet.

Midwestern Gas Transmission Co., subsidiary of Tennessee Gas Transmission Co., is seeking permission to import 204 MMcfd at the Canadian border. Michigan-Wisconsin would buy most of it to resell to distributors.

Trans-Canada Pipelines Ltd. would supply the gas. Officials of the Canadian company testified before the FPC that they could deliver the gas for at least 14 years in the quantity involved. With present reserves, it could supply lesser quantities after that. But it expects new reserves to be added.

Import hearings opened before the FPC in late July, were recessed in August, and are underway



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stringing job, large or small. Give us a call
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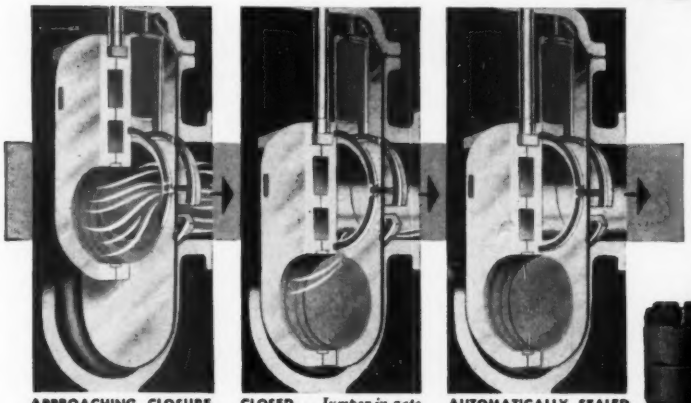
For pipeliners who hate leaks!

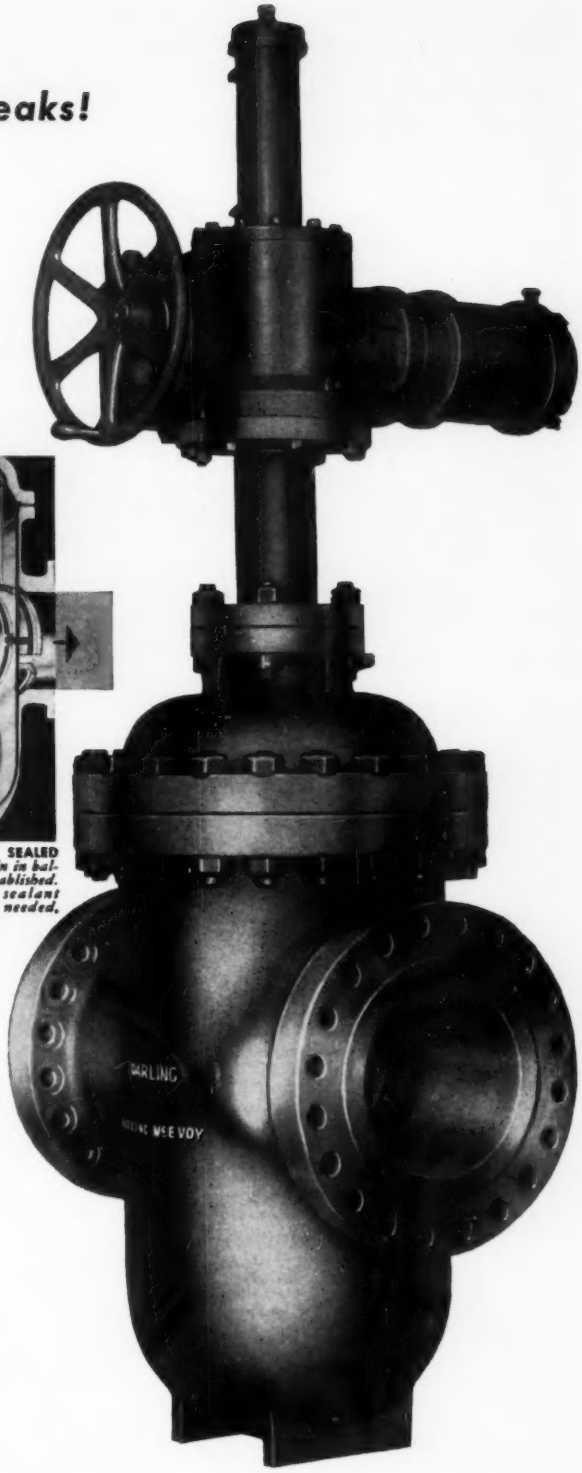
DARLING-McEVOY SELF-SEALING CONDUIT VALVES



APPROACHING CLOSURE ... *No loss of sealant as sealing groove in seat is disconnected from reservoir until gate is fully closed.*

CLOSED ... *Jumper in gate now permits differential pressure to feed sealant into seat groove to check any remaining flow.*

AUTOMATICALLY SEALED ... *Pressures again in balance. Tightness established. No additional sealant used until again needed.*



THE DIAGRAMS above show how these unique conduit gate valves seal themselves *automatically* . . . by means of a long lasting reservoir-held sealing compound . . . for leak-proof, pressure-tight closure every time! This feature, with flow in either direction, self-aligning non-wedging gates, and fully protected non-distorting seats, means exceptional performance, utility and service life. For additional information on these fully field-proved Darling-McEvoy valves, ask for Bulletin 5402.

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DARLING VALVE & MANUFACTURING CO.

Williamsport 26, Pa.

Manufactured in Canada by Sandilands Valve Manufacturing Company, Ltd., Galt 19, Ontario

again. Initial testimony concentrated heavily on proving supplies. The FPC last year turned down the import bid largely on the basis of what it called "insufficient proof of adequate reserves" to justify starting the sales.

Witnesses for the companies involved were hoping to get import approval by Nov. 1—the date when Midwestern's gas options with Trans-Canada run out. But FPC Hearing Examiner Emery J. Woodall indicated it would take much longer to study the case.

Spokesmen for the coal industry voiced opposition to the project on the usual grounds that it would flood "our traditional coal markets" with a foreign fuel.

Washington gas industry experts expect the once-bitterly contested project to win approval eventually from both U. S. and Candian governments. Most of the opposition of competing firms has been eliminated by combining them into the project. In some cases, other companies have gotten a piece of the market area included in the original Midwestern-TGT plan, which involved interconnecting lines from Texas to Canada with supplies of gas entering at both ends.

FRANCE is going ahead with plans to build the "almost impossible" natural gas pipeline across the Mediterranean to the lush oil-gas fields of northern Africa.

Reports from Paris reaching U. S. government officials indicate that the De Gaulle government is "highly encouraged" by new detailed marine surveys of two alternative routes. One would go across the Straits of Gibraltar and the other south from the Spanish coast near Cartagena.

If constructed — and some reports indicate it may be in as little as five years—the trans-Mediterranean pipeline would be as much "a Europe" pipeline as "a French" supply. Spain, whose cooperation is essential because of its location, already has been promised some of the gas the line would carry, diplomatic reports indicate.

Germany and Belgium would also undoubtedly be customers for the line. These power-hungry countries have recently gotten a taste of natural gas from large deposits now producing in France. Most of the natural gas produced in the rich Sahara oil fields is now flared off. Presumably, it could be purchased at low prices, at least until a large demand were developed on the Continent.

French government officials are using radio to sound the depths of the two alternative routes. The Gibraltar route would be the shortest. But it would hit the African coast in politically-seething Morocco.

The other route, some 130 miles across water, would connect to gathering systems in Algeria. Although this country too is unstable because of a continuing nationalist fight for independence from France, the turbulence so far is under some control.

The ocean floor reaches a depth of 2000 ft or more on both routes. ■

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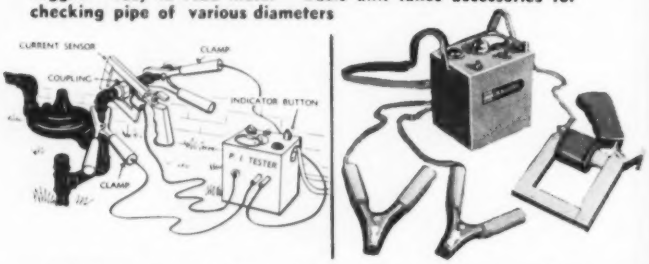

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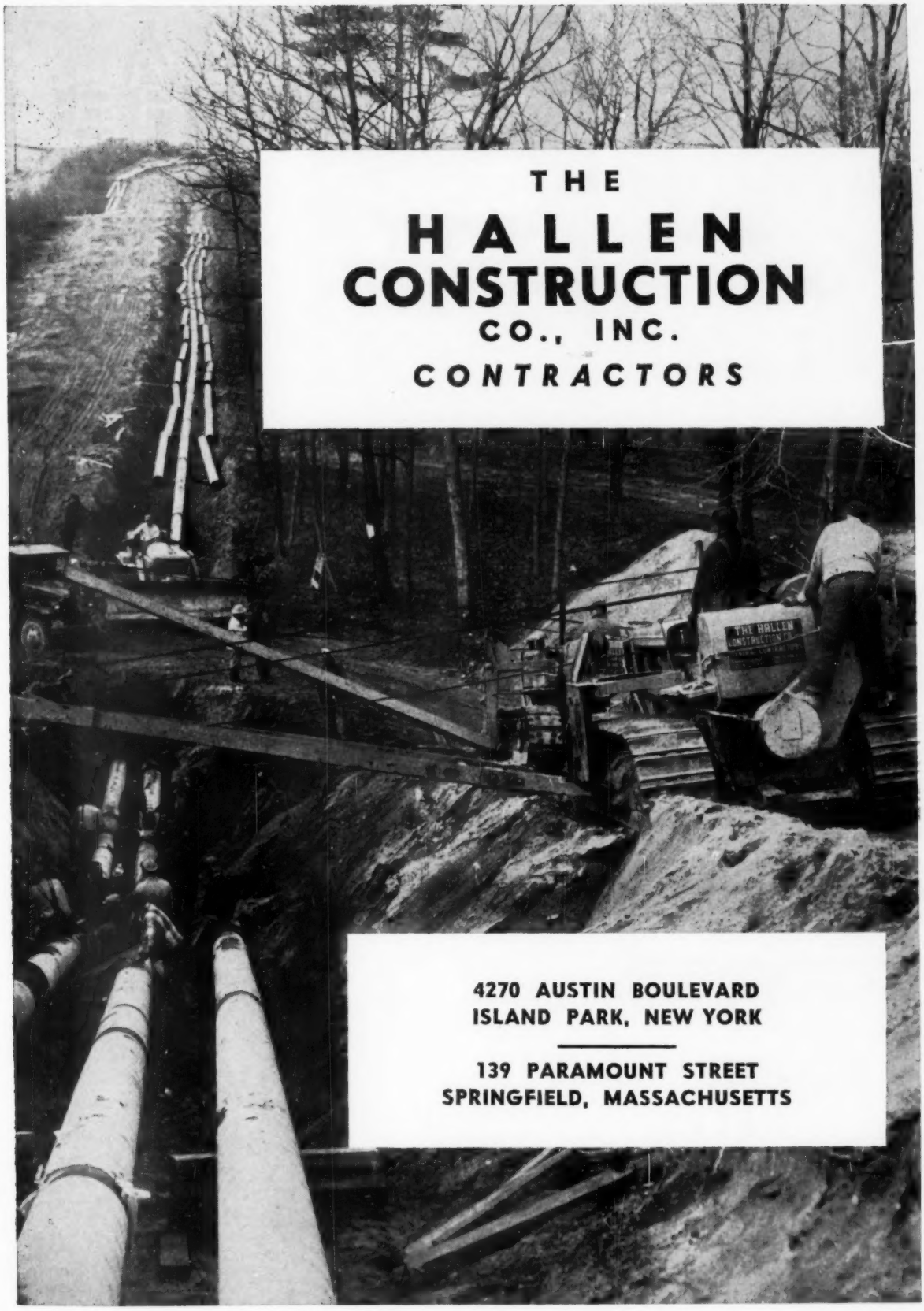
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October

5-7..American Gas Association Annual Convention—Conrad Hilton Hotel, Chicago.

8-9..California Natural Gasoline Association Annual Fall Meeting—Huntington-Sheraton Hotel, Pasadena.

13-14..Gas Measurement Institute — National Guard Armory, Liberal, Kan.

14-16..Wisconsin Utilities Association Operating & Sales Convention—Schroeder Hotel, Milwaukee.

26-27..Independent Natural Gas Association of America Annual Meeting—Westward Ho Hotel, Phoenix.

29-30..Oil Recovery Symposium on Southwest Texas (Sponsored by Southwest Section of AIME and Texas Petroleum Research Committee)—Driscoll Hotel, Corpus Christi, Texas.

November

12..AGA-Mid-West Pubic Relations Workshop — Cornhusker Hotel, Lincoln, Neb.

1960

February

29-Mar. 2..AGA General Management Section Conference — Pittsburgh-Hilton Hotel, Pittsburgh, Pa.

March

14-18..National Association of Corrosion Engineers Annual Convention, Dallas.

21-23..Mid-West Gas Association Annual Meeting—Hotel St. Paul, St. Paul, Minn.

24-25..New England Gas Association Annual Meeting—Hotel Statler, Boston.

30-April 1..GAMA Annual Meeting—The Greenbrier, White Sulphur Springs, W. Va.

April

20-22..Indiana Gas Association—French Lick-Sheraton Hotel, French Lick, Ind.

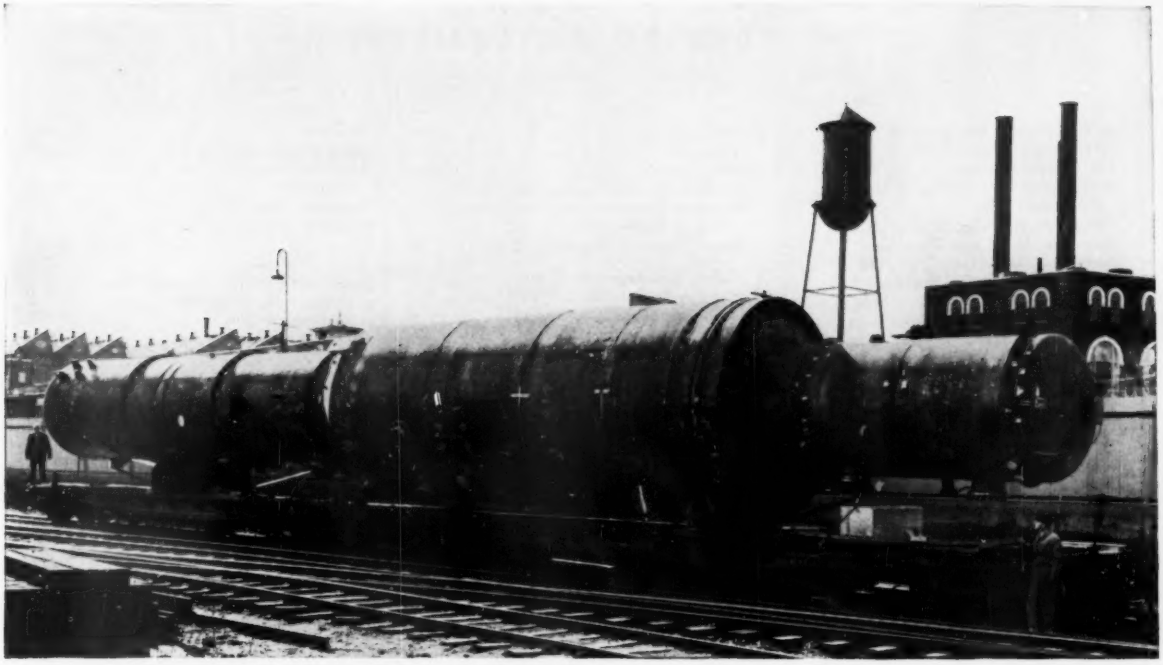
25-27..Southern Gas Association Annual Convention—Galveston, Texas.

May

9-13..AGA Operating Section, Joint Distribution and Transmission Conference — Hotels Roosevelt and Jung, New Orleans.

16-18..AGA-Mid-West Regional Gas Sales Conference — Edgewater Beach Hotel, Chicago.

23-25..AGA Operating Section Production Conference—Hotel Roosevelt, New York.



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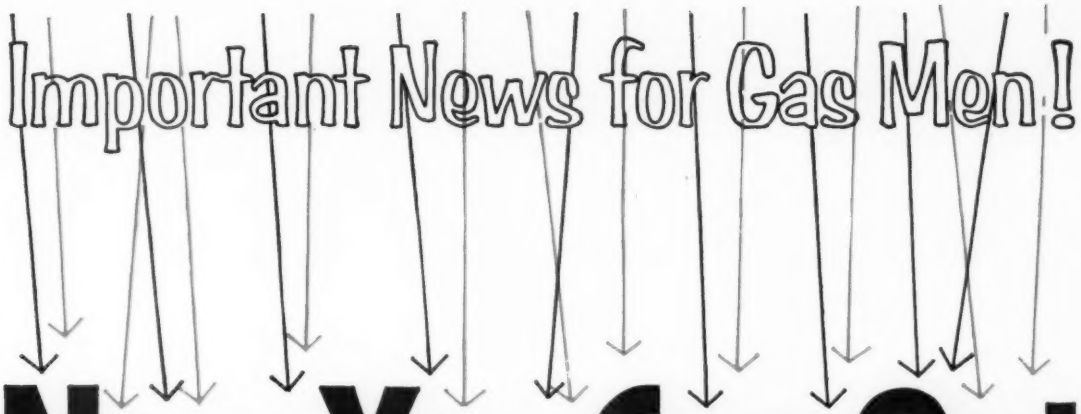

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